HANDBOOK

FOR THE

12-PR. B.L. 6 CWT. GUN

(MARK I).

(HORSE ARTILLERY.)

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
PRINTERS IN ORDINARY TO HER MAJESTY

And to be purchased, either directly or through any Bookseller, from
EYRE & SPOTTISWOODE, East Harding Street, Fleet Street, E
JOHN MENZIES & Co., 12, Hanover Street, Edinburgh
90, West Nile Street, Glasgow; or
HODGES, FIGGIS, & Co., Limited, 104, Grafton Street,

189

Price One Sh

1896

HANDBOOK

FOR THE

12-PR. B.L. 6 CWT. GUN

(MARK I).

(HORSE ARTILLERY.)

1896.

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
PRINTERS IN ORDINARY TO HER MAJESTY.

And to be purchased, either directly or through any Bookseller, from
EYRE & SPOTTISWOODE, East Harding Street, Fleet Street, E.C.; or
JOHN MENZIES & Co., 12, Hanover Street, Edinburgh, and
90, West Nile Street, Glasgow; or
HODGES, FIGGIS, & Co., Limited, 104, Grafton Street, Dublin.

1896.

Price One Shilling.

CONTENTS.

N.B.—This Handbook is corrected up to October, 1896. Any alterations which may be suggested should be forwarded direct to Chief Inspector, Royal Arsenal, Woolwich.

* *This information will be furnished hereafter.*

ORDNANCE, B.L., 12-PR., 6 CWT. (MARK I).

GUN.

(*Plate I.*)

Material			Steel (wire construction).
Weight	of gun, without fittings		6 cwt. 14 lb.
	of breech fittings		1 qr. 1 lb.
Length, total			66·75-in.
Bore	calibre		3-in.
	length		59 „
Chamber	diameter		3·2 „
	length		9·05 „
Rifling	system		Polygroove—hook section.
	length		49·25-in.
	twist		Increasing from 1 turn in 105 calibres at breech end of rifling to 1 in 28 at 15-in. from the muzzle; the remainder uniform 1 turn in 28 calibres.
	grooves	number	18
		depth	·04 of an inch.
		width	·4 „ „

The gun is made of steel and wire, and consists of an A tube, around which are wound successive layers of steel wire, extending over the powder chamber and a portion of the bore. The jacket with trunnions is fitted over the exterior of the wire and a portion of the A tube, and secured longitudinally by a shoulder on the A tube, and a steel breech bush screwed into the jacket at the rear. The breech bush is prepared for the reception of the breech-screw, and furnished with lugs for the attachment of the breech fittings and elevating mechanism; the rear portion of the bush also forms a hood for the protection of the fittings. The B hoop is shrunk round the A tube immediately in front of the jacket, by which it is partially overlapped.

The chamber is cylindrical, slightly coned at the entrance, and terminating in front with a curved slope.

On a certain number* of guns, a plane for clinometer is prepared on the exterior of the jacket at the breech, but no more will be so prepared.

Breech-closing mechanism.

(*Plate II.*)

The breech is closed by a parallel screw having three portions of the screw thread removed longitudinally, each one-sixth of the circumference. The interior of the gun at the breech being prepared in a similar manner, admits of the screw, when the raised portions are placed opposite the smooth surfaces in the gun, being pushed home, and locked by the sixth of a turn.

* Nos. 4, 5, 6, 16, 17, 18, 19 20, 21, 22, 23, 24, 25 and 28 only have the clinometer plane.

The breech-screw has hinged to it a cam lever, by means of which it is locked and unlocked; the cam portion of the lever (when the breech-screw is locked) falls into a recess in the carrier ring, and so prevents any movement of the breech-screw during firing. In lowering the cam lever, after the breech-screw is unlocked, the cam acting upon the surface of the carrier ring, starts the first movement to the rear of the breech-screw and obturator.

Encircling the rear end of the breech-screw, and hinged to the hood, is a carrier ring, which supports the screw when withdrawn.

The carrier ring is held to the gun during the withdrawal of the breech-screw, by means of a clip fitted to the left side of the ring, engaging with a recess in the hood.

A stop bolt in the right side of the carrier ring serves to prevent the breech-screw being disengaged from the carrier ring when withdrawn; at the same time, the clip in the left side of the carrier ring is disengaged from the recess in the hood by means of a spiral spring, which forces the opposite end of the clip into a recess in the breech-screw, thus securing the latter in the carrier ring. When in this position, the whole can be swung clear of the breech opening to admit of loading.

If, when opening the breech, the carrier ring remains fast, owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech mechanism wrench, in the hole provided for this purpose, on the left side of the breech.

Obturator.

The system of obturation consists of a circular pad, with protecting discs fitting the mouth of the chamber, being placed between the mushroom head of the axial "T" vent and the breech-screw.

The pad, being slightly elastic, expands radially when compressed by the action of the powder gas, thus sealing the escape.

To prevent play, owing to slightly varying dimensions of the pads, and their becoming compressed by firing, thin adjusting discs of steel are placed between the rear protecting disc and the face of the breech-screw.

Firing Mechanism.

The firing mechanism is designed for friction firing, with "T" friction tubes.

It consists of a steel axial "T" vent, passing through the longitudinal axis of the breech-screw, having secured to its outer end a head for the reception of the "T" friction tube. The axial "T" vent is retained in position by means of a spring catch in the breech-screw. Fitted to the outer face of the breech-screw and encircling the head of the axial "T" vent is an actuating collar, worked by the cam lever, by means of which the "T" tube is automatically turned into the firing position, and the vent sealed when the cam lever is lowered. The "T" tube is automatically released from the vent and turned into the position for withdrawing when the cam lever is raised, the tube being withdrawn by hand.

A "T" vent rimer is provided for clearing the taper portion of the vent channel in the "T" vent, in the event of it getting choked, so as to admit of the insertion of the tube.

Sighting.

(*Plate III.*)

The gun is side sighted and is provided with two rows of sights.

The tangent sights are of steel; the cross-heads are furnished with screw deflection leaves, giving deflection to 1½ degrees right and left, and having notches at the top and small eye holes underneath. The bars are triangular in section and are graduated on the rear face to 4,000 yards for a muzzle velocity of 1,553 ft. secs., and on the right face to 13 degrees. The sights fit into bronze sockets held by fixing screws, and are provided with movable clamps. The bronze sockets are set at an angle of 1° 30′ for correction for drift.

Spring bolts, passing through the sockets, enter recesses in the sight bars when at zero, and prevent their being shaken out when the gun is passing over rough ground. The bolt on the right side is moved by pushing in, and that on the left, by pulling out, so as to make the sights interchangeable.

The foresights are of bronze, with circular apertures containing an aluminium blade projecting from the left side to the centre surmounted by a steel acorn point. The sights are interchangeable, and slide into grooves in front of the trunnions, being retained by spring studs, which are released by raising the catches.

The sight is correctly set—

For elevation.—When no space can be seen between the line marking the graduation ordered and the top of the clamp, while the line is not covered by the clamp.

For deflection.—When the line marking the graduation ordered is exactly in continuation of the arrow head.

Telescopic Sight.

The guns have been fitted with a steel bracket for carrying the telescopic sight. The bracket is firmly attached to the face of the right trunnion by a dovetail and two fixing screws. A bronze adjusting screw is provided in the upper part of the bracket, to alter the position of the telescope, so as to correct for difference of level of the wheels. A leather cover for the bracket is provided, shaped to suit the bracket, and secured in position by a ⅝-in. strap.

Description and instructions for using, &c., are published in a separate handbook.

Care and Preservation of Gun and Fittings.

The gun should be examined after firing 150 rounds with projectiles.

The breech fittings should be kept clean, oiled or greased, and in good working order; all working surfaces must be well lubricated, the fittings being taken off sometimes for this purpose, especially after firing.

To lubricate the hinge bolt of the carrier ring without removing the fittings, the small screw on the top of the hinge bolt should be removed and oil poured into the channel, taking care to replace the screw after oiling.

All fittings of the gun should be treated with care; violence and jerks should be avoided, and no unnecessary force should be employed.

The breech fittings should work easily, and be free from cracks and burrs; the latter can be removed by filing, but this must be done carefully so as not to permanently damage the fitting. Should a crack be observed in a breech fitting, such fitting should be exchanged.

The threads of the breech-screw should be free from burrs; should the screw not work easily, when the obturator has been detached, the defect may often be remedied by careful filing, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered by the leather cap provided for this purpose to prevent dust and grit getting into the interstices of the breech fittings.

De Bange Obturator.

The obturator consists of a mushroom-headed axial "T" vent of steel, passing through the longitudinal axis of the breech-screw, with a pad and pair of metal discs. The inner face of the breech-screw is flat, and between it and the head of the axial "T" vent the pad and discs are arranged. The pad is made of asbestos, worked up with mutton suet to a proper consistency, and enclosed in a strong canvas cover; it is reduced to shape and pressed in a hydraulic machine, and afterwards subjected to higher pressure in the gun by firing heavy charges at proof. The pad is enclosed between two tin discs, the outer angles of which are protected by steel rings. The gun is slightly coned at the seat of the obturator when pushed home, and the pad is provided with a corresponding taper to insure a good fit.

In putting the obturating pad and discs on the head or vent axial, first place the front protecting disc with its rounded side fitting the back of the mushroom head, then the pad with that side to the front which is curved to fit the front disc, the stitched side being to the rear, then the rear protecting disc, and in placing this, its flat side and bronze ring with which it is bushed should be on the opposite side to the pad.

If correctly assembled, the whole should fit together compactly. Should there be any play between the obturator and the face of the breech-screw, one or more adjusting discs are placed behind the protecting disc.

The pads and discs issued on the breech-screw with a gun have always been previously expanded in that gun, but the first time any other pad is used it should be with a shotted round.

Action.

When the breech-screw is pushed into the gun, the obturator enters the chamber with perfect ease; on turning the breech-screw, the obturating pad is pressed home into the coned seat in the gun by the travel of the screw. The bore is thus perfectly closed by a species of buffer in contact all round the circumference, while the head of the axial "T" vent receives the force of the gas on discharge. On firing the gun, the pressure acts on the head of the vent, and compresses the pad against the breech-screw, causing it to expand laterally; from symmetry of form and position, this expansion must be radial to the axis and equal in every direction, and is sufficient to prevent the escape of the gas. On the pressure being removed, elasticity comes into play, and the obturator can be withdrawn from the cone by a straight pull, which can be given as soon as the screw is unlocked.

The pads are almost indestructible, except perhaps from the wear of opening and closing the breech, but if the firing is rapid they may get softened by heat; in this case, the pad should be changed and thrown into cold water for a time, when it will soon be restored to good condition again. Spare pads are provided, and also steel adjusting discs, which should be inserted between the rear protecting disc and the face of the breech-screw if the pad becomes compressed by firing, but in all cases the obturating pad and discs should turn freely on the breech-screw.

The outer canvas of the obturating pad should be free from rents; small bruises, likely to be removed by the pressure of firing, are of no importance.

If the pad is not in good order, or there are too many adjusting discs behind the pad, stiffness in working the breech will probably result.

The obturating pad should be rubbed occasionally with Russian tallow, mixed with oil or some other suitable lubricant, and the pad with protecting discs should be carefully handled to prevent them being indented or bruised

The obturating pads and discs should be kept complete on the axial "T" vent in the gun, or in the brass boxes provided for the purpose, as there is a tendency of the pad to swell in the direction of its axis, which might cause difficulty in adjusting it on the breech-screw.

When the obturator is attached to the breech-screw, the removal of the latter from the carrier ring should be done by two persons, as care is necessary to keep the "clip, retaining, carrier ring" withdrawn clear of the breech screw before drawing the latter back, to avoid damaging the obturating pad and discs. The obturator should, however, always be detached, when possible, from the breech-screw before removing the latter from the carrier ring.

Clip, Retaining, Carrier Ring.

If, when opening the breech, the carrier ring remains fast, owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech mechanism wrench in the hole provided for this purpose on the left side of the breech, and tapping the wrench with a hammer.

To Remove the Breech Fittings.

Before removing the fittings, the breech should be opened, the breech-screw being swung into the loading position.

Obturator.

Press down the lever of the spring catch in the breech-screw, the axial "T" vent can then be withdrawn from the front of the breech-screw, and the obturating pad and discs removed from the vent.

Breech-Screw.

When the breech is open, the breech-screw is held in the carrier ring by a stop bolt on the right, and by the retaining clip of the carrier ring on the left. By withdrawing the retaining clip from the breech-screw and holding it back (by means of a screwdriver used as

a lever), the breech-screw can be moved forward and the stop bolt pushed out from behind; the breech-screw can then be withdrawn from the carrier ring, the retaining clip being held back until the breech-screw is clear of the ring.

Carrier Ring.

This is attached to the breech by a hinge bolt secured by a keep pin. When the latter is taken out, the hinge bolt can be removed by giving it a few taps underneath with a piece of wood.

Clip, Retaining, Carrier Ring.

This retaining clip is actuated by a spiral spring, and retained in the carrier ring by means of a set screw. On the removal of the set screw, the clip and spiral spring can be withdrawn from the ring.

Collar, Actuating, "T" Friction Tube.

To remove the actuating collar from the breech-screw, the cam lever must be lowered; the lever of the spring catch must then be pressed down, and the actuating collar turned to the left; the collar can then be removed to the rear.

Spring, Catch, Breech-Screw.

To remove the spring catch, it must be pressed outwards, by means of a piece of wood (used as a lever in the interior of the breech-screw), until the axis pin of the lever is clear of the exterior of the breech-screw. The axis pin can then be removed, by means of a screw-driver, and the lever and catch, with spiral spring, withdrawn from the breech-screw.

Cam Lever.

The cam lever must be lowered and withdrawn to the left.

To Re-assemble the Breech Fittings.

The converse of the above action takes place in re-assembling the fittings on the gun.

Care must be taken, when placing the axial "T" vent and obturating pad and discs in the breech-screw, to see that the indicating arrows engraved on the mushroom head of the axial "T" vent and the front end of the breech-screw correspond, as it is in that position only that the spring catch in the breech-screw, for retaining the obturator, will engage with the recess for its reception in the axial "T" vent.

Rifles, Aiming, M.-H. Chamber, Ewart B.L., 12-pr., 6 cwt.

This apparatus is for use with the gun in imparting instruction in laying, and consists of the following parts :—

Rifle, aiming, M.-H. chamber, Ewart—

Bands	bronze, two to a set, front and rear, with key, buffer, and securing bolts.
Barrel, rifle	M.-H. rifle barrel, with breech action and metal boss.
Cord, firing	white line, tarred, 2 yards long (with two hooks).
Link, trigger	bronze, with fixing screw.
Tube, aiming, M.-H. rifle ..	including breech-piece, bushes (movable and fixed), set nut, and leather washer.

Tube, aiming, 0·23-in.—
- Brush, cleaning.
- Key, M.-H.
- Rod, cleaning.

Method of Fitting, Adjusting, and Using the Apparatus.

The aiming rifle is fitted to the left side of the gun in the following manner:—

The two bands are placed over the exterior of the gun, the front band over the chase immediately in front of the B hoop, and the rear band over the jacket, the distance between the inner faces of the bands being 27-in. The bands are secured round the gun by fixing bolts. The muzzle of the rifle is passed through the hole in the arm projecting from the front band, and the breech is placed in the socket on the rear band, and fastened with a key. A buffer spring, to lessen the strain on recoil, fits into the socket in rear of the rifle. A hole is made at the rear end of the socket to facilitate the extraction of the buffer spring.

To adjust the rifle on the gun, the latter is laid horizontally; the ·23-in. tube is then inserted in the bore of the rifle, sufficient length being allowed to project from the bore to admit of the application of a spirit level to the ·23-in. tube, by which means the rifle is levelled, so that the axis of rifle and gun are in parallel horizontal planes. The bands are then firmly screwed up, care being taken to see that they do not shift during the operation, in the event of which they must be slackened and re-adjusted.

Elevation is obtained by means of the gun sights, and any error in line is corrected by use of the deflection scale.

The rifle is fired by means of the firing cord, which is attached at one end by means of a hook to the loop of the trigger link, the other end of the cord being led round the breech of the gun to the firing number.

CARRIAGE, LIMBERS, AND WAGONS.

Carriage, Field, B.L., 12-pr., 6 cwt., Mark I.
Limber, Field, B.L., 12-pr., 6 cwt., Mark I.
Wagon, Ammunition, B.L., 12-pr., 6 cwt., Mark I.
Wagon, Forge, R.A., Mark I*.
" " " " II.
" " " " III.
Limber, Wagon, Forge, R.A., Mark I**.
" " " " " II*.
" " " " " III*.
Wagon, Store, R.A., Mark I.
" " " " II.
Limber, Wagon, Store, R.A., Mark I*.
" " " " " II*.
Wagon, Artillery, Mark I*.
Wagon, Ammunition and Store, R.A., Mark II*.

Carriage, Field, B.L., 12-pr., 6 cwt.

(*Plate IV.*)

The carriage consists, generally, of two side brackets and elevating gear, mounted on an axle-tree having second class arms, and field wheels.

The side brackets are connected by transoms and the plate portions of the trail eye, and are made of steel plate, riveted to angle steel frames, which are formed at the upper ends into bearings for the gun trunnions. Two compartments are formed between the brackets, each being fitted with a wood block, the upper one to contain a McMahon spanner, a pair of pincers, a claw hammer and a spoke brush, and the lower a No. 9 oil can.

The trail eye (No. 20) is of wrought-iron, the eye being fitted with a movable piece of hard steel.

The axletree (No. 89) is a tubular steel forging with 2nd class arms; it is passed through a hole in the front of each bracket, and is secured in position by flanges, which pass over octagons cut on the axletree. The axletree is also connected to the brackets by a tensile stay on each side.

The wheels are 2nd Class, "C," No. 35, 5-ft. in diameter, with steel nave, removable pipe box, and a 3-in steel tire with rounded edges. The nave consists of two flanges of corrugated steel, which are connected by 14 bolts; the inner flange is fitted with a steel ring to strengthen it, and the outer flange with a metal centering ring; the pipe box passes through the flanges, and is secured by a nut, which is prevented from working loose by a spring fixed to the pipe box. A spanner (No. 93) is provided for removing the pipe box; it is carried on the right carriage bracket.

A shell pocket is fitted on each side of the trail (near the axletree), and will hold two Shrapnel shell, one case shot, and three cartridges.

The shell pockets will not carry ammunition in addition to that contained in the ammunition boxes, and will only be filled:—

(*a*) On active service when in the judgment of the battery commander it is desirable to be prepared for immediate action.

(*b*) At practice camp, or drill, when necessary, for the rehearsal of (*a*).

The elevating gear (which is actuated by a hand-wheel on the right side of the carriage) consists of an elevating screw, bevel pinions, elevating nut, spindle and hand-wheel, the whole being carried by an oscillating bracket, which is supported in bearings attached to the brackets.

The carriage is furnished with shoe brakes and a drag shoe.

The brake consists of two brake shoes, two steel wire ropes, two sets of suspending chains, and two drag washers with Q link. The brake shoes (which are in one steel forging with the sides splayed out to the front), are attached to the sides of the carriage near the trail eye by the wire ropes; the inner sides are connected by the suspending chains to the axletree, and when in use, the outer sides are connected with the drag washer. The drag washer has a loop for use with the drag rope, and on the opposite side, a Q link or sliding hinged hook, similar to that used for traces.

In action, the shoes are placed on the ground behind and against the wheels, and the outer suspending chains are connected to the drag washers. On recoil, the wheels of the carriage run on the brake shoes, the steel wire ropes being of sufficient length to ensure the wheels riding on the shoes during recoil. On running up, the wheels leave the shoes, which remain in position for the next recoil. When not in use, the shoes and outer suspending chains are hung on hooks (the chains being first placed on the hooks and the shoe being turned over before being hooked up) fixed to the axletree for the purpose, and the wire rope placed on hooks on either side of the trail.

For travelling, a drag shoe (No. 7) is provided; it is attached by a No. 18 chain to the under side of the trail, and, when not in use, is hung on a hook fixed to the breast of the carriage, the chain being placed on the hook right side (travelling) of the carriage.

A traversing handspike (No. 2) fits into a socket which is hinged to the lower part of the trail. In action, the socket is held in position by a pawl; when travelling, it is turned over, and the handspike is strapped to the top of the trail; this handspike is also used as a rammer.

The carriage is furnished with a loop and hooks for the drag shoe and chain, advance rings, hooks for sponge buckets, locking plates, fittings for carrying two aiming posts, and a tube pocket. (*See* packing diagram A.)

* Limber, Field, B.L., 12-pr., 6 cwt.

(*Plate VI.*)

The limber consists of a frame and an ammunition box, mounted on a 2nd Class axletree and field wheels, a pole with draught chains, and supporting bar, and two steel swingletrees.

The frame consists of four futchels; the two inner are of steel plate, flanged top and bottom, with holes bored in the deepest part to suit the axletree; the two outer futchels are of angle steel, and are bolted to brackets which connect them to the axletree. Diagonal stays, of angle steel, are attached to the outer futchels, over the axletree, and to the inner futchels at their forward ends, where the staple for the pole is riveted between them. A platform and a footboard are bolted to the top, and draught hooks (for the swingletrees), to the front of the outer futchels. At the rear, brackets are fitted on each side of the limber hook for a wood shelf, to facilitate the setting of fuzes.

---

* The limbers for carriage and ammunition wagon are alike.

The ammunition box is of wood; it is fitted with two lids, a striking plate (to take the blow of the trail when limbering up), and cranked guard irons with leather guards. The box is fitted internally with partitions, and arranged to carry a supply of Shrapnel shell, case shot, cartridges, fuzes and friction tubes. The projectiles are carried upright, the bottoms fitting in aluminium trays,* fixed to the bottom of the box; the projectiles are steadied at the top by wooden blocks, which fit between their heads, and are held in notches in the top of the partitions, and the ends of the box, by wood battens attached to the lids. Two cartouches, each holding 22 cartridges and three fuze boxes (two No. 20 and one No. 21), are carried in suitable compartments. A leather holdall for gun fittings, &c., is attached to the inside of each lid.

Fittings are attached to the rear of the box for securing two portable magazines.

A wrought-iron limber hook (No. 13), with movable steel, is riveted to the inner futchels.

The axletree (No. 98) is of weldless steel tube with 2nd Class arms; it is fixed to flanges, which are attached to the futchels.

The fittings for draught consist of a pole (12-ft. 7-in. long), two No. 10 swingletrees, a No. 2 supporting bar (3-ft. 2½-in. long), with a steel socket with loop at each end, and two No. 2 draught chains, each about 2-ft. 10½-in. long, with a ring at one end and a Q at the other.

The wheels, No. 35 "C," are the same as those described for the carriage.

The limber is fitted on the underside to carry a 3-lb. grease tin, and a No. 3 lubricating can, and on the "near" side of the platform board, a steel box for telescopic sight, also various stores as shown in packing diagram A.

One limber per battery will be fitted with loops for kicking straps.

Wagon, Ammunition, B.L., 12-pr., 6 cwt.

(*Plate V.*)

The wagon consists of a steel frame, a hollow box perch, and an ammunition box, mounted on a 2nd Class axletree, and field wheels.

The frame consists of two flanged sides connected by a rear plate and diagonal stays. A platform and a footboard are fitted to the sides in the front, and at the rear, brackets are fitted for a wood shelf to facilitate the setting of fuzes.

The perch, which is connected to the frame, is made of steel plate; it is fitted with a perch eye (No. 7), with movable steel, locking plates, and a loop for the attachment of the drag shoe (No. 7) and chain (No. 18). The drag shoe, when not in use, is carried on the top of the perch, secured by a leather strap.

The ammunition box is generally similar to that described for the limber, but differs in the arrangement of the internal fittings. Two cartouches, each holding 24 cartridges, a small holdall containing gun fittings, and three fuze tins (No 20), are carried in suitable compartments.

The axletree (No. 99) is of weldless steel tube with 2nd Class arms. The wheels are the No. 35 "C," the same as for the carriage and limber.

The wagons are fitted to carry various stores, as shown in diagram A.

---

* These aluminium trays are being replaced by wood blocks.

Dimensions, &c.

	Carriage and Limber.	Wagon and Limber.
Height to axis of gun	3-ft. 4-in.	—
Length of carriage and limber with gun	24 „ 9 „	—
Length of carriage and limber without gun ..	23 „ 1 „	—
Length of wagon and limber	—	21-ft. 8-in.
Length of axletree	6 „ 2 „	6 „ 2 „
Length between axletrees	9 „ 0 „	7 „ 3 „
Greatest projection beyond track of wheels	0 „ 6 „	0 „ 6 „
Maximum width	6 „ 2 „	6 „ 2 „
Wheels track	5 „ 2 „	5 „ 2 „
Wheels diameter	5 „ 0 „	5 „ 0 „
Space required to turn in	33 „ 0 „	30 „ 0 „
Angle of trail	$28\frac{1}{2}^{\circ}$	—
Angle of lock	62°	60°
Upsetting angle	32°	33°
Elevation, maximum	16°	—
Depression	8°	—
Tonnage for shipment	*5·633 tons	6·08 tons
Tonnage for transport in boats	11·59 „	11·32 „
Rectangular space occupied in boats	14′ 10″ × 6′ 3″ × 5′	14′ 6″ × 6′ 3″ × 5′

* Without gun.

Weights (approximate).

(Packed.)

	Carriage and Limber.	Wagon and Limber.
	cwt. qr. lb.	cwt. qr. lb.
Carriage and limber	31 0 2	—
Wagon „	—	31 0 22
Carriage and limber weight on two fore wheels ..	16 0 8	—
Carriage and limber „ „ hind „ ..	14 3 22	—
Wagon and limber „ „ fore „ ..	—	16 0 4
Wagon and limber „ „ hind „ ..	—	15 0 18
Carriage (trail on ground)	15 3 24	—
Limber carriage	15 0 6	15 0 6
Limber wagon		
Wagon (perch on ground)	—	16 0 16
Weight at end of pole (limbers)	0 1 2	0 1 2
Pressure of perch on ground (wagon) ..	—	1 2 0
„ trail „ (carriage) ..	1 1 0	—
Wheel, No. 35..	1 3 4	1 3 4

Wagon, Forge, R.A., Mark I*.

Limbers, Wagon, Forge, R.A., Mark I**.

These wagons and limbers are the Mark I pattern, converted to conform, as far as possible, to the Mark II pattern (page). Runners and guides are fitted to the tailboard and bottom of the wagon to carry either the Mark IV field or the Mark II G.S. forge. The wagon is fitted with four under boxes, two lantern boxes, one for two distinguishing lanterns† and one for two folding lanterns.

The limber for this wagon is the Mark I pattern, fitted for pole draught, and with the limber box altered internally to conform to the limber box of the Mark II* and III* limbers.

The pole draught will be the same as that for the carriage and wagon limber.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

Total length, with pole	.. ..	‡
Maximum width	.. ..	
Length between axles	.. ..	
Wheels — track	.. ..	
Wheels — diameter	.. ..	
Space required to turn in	.. ..	
Angle of lock	.. ..	
Upsetting angle	.. ..	
Rectangular space occupied in boats	.. ..	
Tonnage — for shipment	.. ..	
Tonnage — ,, transport in boats	.. ..	

Weights.

(Packed.)

	cwt.	qr.	lb.
Wagon and limber	.. ..	‡	
Wagon and limber .. weight on two fore wheels	..		
Wagon and limber .. ,, ,, hind ,,	..		
Wagon (perch on ground)	.. .. ..		
Limber	.. ..		
Weight at end of pole	.. ..		
Pressure of perch on ground	.. .. ..		

Wagon, Forge, R.A., Mark II.

Limber, Wagon, Forge, R.A., Mark II*.

The wagon consists of a frame of angle iron, a perch, and an axle-tree, built upon the box girder principle, and two field wheels.

The perch is formed of two pieces of "channel" iron, connected by collar bolts, top and bottom plates, and a perch eye which is riveted between them at the front; it is fitted to carry an anvil and

† Distinguishing lanterns are carried with ammunition columns only.

‡ These particulars will be issued hereafter.

block on the top, and a drag shoe and chain on the "off" side. On the top of the perch two holes are drilled to receive a vice.

The frame of the wagon is boarded over, and fitted with side boards and movable head and tailboards to form the body of the wagon.

The body is divided into two compartments by a cross partition. The hind compartment is covered with a lid which is hinged to the partition; the front compartment is covered by two removable cutting boards and a narrow flap, which is hinged to the cover of the hind compartment. Two tool chests (one for smith's tools and one for wheeler's tools) are carried in the front compartment, and a Mark IV† field forge in the rear compartment.

The wagon is fitted with four under boxes, two lantern boxes (one for two distinguishing‡ lanterns and one for two folding lanterns), and four bale hoops for a canvas cover.

The limber for this wagon is the Mark II pattern, fitted for pole draught, and with a limber box arranged internally for cans, boxes, and tins to carry the oil, soap, dubbing, &c., allowed for this equipment.

The pole draught is the same as that for the carriage and ammunition wagon limber.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

Total length, with pole		§
Maximum width		§
Length between axles		§
Wheels	track	§
	diameter	§
Space, required to turn in		§
Angle of lock		§
Upsetting angle		§
Tonnage	for shipment	§
	„ transport	§

Weights.

(Packed.)

	cwt.	qr.	lb.
Wagon and limber			
Wagon and limber — weight on two fore wheels			
Wagon and limber — „ „ hind „			
Wagon (perch on ground)			
Limber			
Weight at end of pole			
Pressure of perch on ground			

§

Wagon, Forge, R.A., Mark III.

Limber, Wagon, Forge, R.A., Mark III*.

The wagon consists of a frame of angle steel, a steel perch, a tubular axletree, and two field wheels.

The frame is fitted to carry four wood boxes, and a "Forge, G.S., Mark II"; the boxes are secured in position by nib irons, and thumb

† This wagon is being altered to take the Mark II G.S. Forge.
‡ Distinguishing lanterns are carried in the ammunition column only.
§ These particulars will be issued hereafter.

screws; the two front boxes are fitted with drawers to carry smith's and wheeler's tools, and the two side are for carrying coal. The forge is placed between the coal boxes, and secured, when travelling, by leather straps and the tailboard of the wagon; when required for use, the tailboard is turned down, and the forge, which is provided with rollers, is run out on the tailboard, to facilitate removal. On the top of the front boxes, are secured a block for the anvil, two lantern boxes (one for two distinguishing† lanterns, and one for two folding lanterns), two picketing ropes, one grindstone, and two empty coal sacks. To the top of the "off" coal box, eight farriers' aprons are strapped.

The perch is formed of steel plate, bent so as to form a tapering box girder, and fitted with a perch eye; it carries an anvil. Two propsticks are fitted on the underside.

The axletree is tubular steel, 2nd Class, "C," No. 38.

The wagon is fitted with four bale hoops for a canvas cover. To the bale hoops, four farriers' bags are strapped.

The limber is generally similar to the carriage limber, but is fitted with a limber box, internally arranged to carry cans, boxes, and tins, for the oil, soap, dubbing, &c., allowed for this equipment.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

	ft.	in.
Total length, with pole		
Maximum width		
Length between axles		
Wheels — track		
Wheels — diameter		
Space required to turn in	‡	
Angle of lock		
Upsetting angle		
Rectangular space occupied in boats		
Tonnage — for shipment		
Tonnage — ,, transport in boats		

Weights.

(Packed.)

Wagon and limber	
Wagon and limber — weight on two fore wheels	
Wagon and limber — ,, ,, hind ,,	
Wagon (trail on ground)	‡
Limber	
Weight at end of pole	
Pressure of perch on ground	

Wagon, Store, R.A., Mark I.

Limber, Wagon, Store, R.A., Mark I*.

This wagon is similar to the forge wagon, Mark II, but the body is divided into three compartments, which are covered with lids. The front and centre compartments are fitted to carry stores, and the rear

† Distinguishing lanterns are carried in the ammunition columns only.
‡ These particulars will be issued hereafter.

compartment, a stationery box, the front of which can be let down on the tailboard (when the latter is supported by its chains) to serve as a writing desk.

The wagon is fitted on the top to carry a lantern box for two folding lanterns, two chests of collar-maker's tools, picketing ropes, luff tackle, and a camp stool.

The limber is the same as that described for the Mark II forge wagon, but the limber box differs in its internal fittings.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

Total length of pole	†
Maximum width	†
Length between axis	†
Wheels { track	†
Wheels { diameter	†
Space required to turn in	†
Angle of lock	†
Upsetting angle	†
Rectangular space occupied in boats.. ..	†
Tonnage { for shipment	†
Tonnage { „ transport in boats	†

Weights.

(Packed.)

Wagon and limber	†
Wagon and limber { weight on two fore wheels ..	†
Wagon and limber { „ „ hind „ ..	†
Wagon (perch on ground)	†
Limber	†
Weight at end of pole..	†
Pressure of perch on ground	†

Wagon, Store, R.A., Mark II.

Limber, Wagon, Store, R.A., Mark II*.

This wagon is similar to the forge wagon Mark III, but the body is fitted with four wooden boxes, secured by nib irons and thumb screws; the three front boxes are for carrying stores, and the rear box for stationery.

The stores carried on the top of the wagon are the same as those for the Mark I.

The limber is that described for the Mark III forge wagon, but the limber box differs in its internal fittings.

The wheels are 2nd Class. "C," No. 36.

† These particulars will be issued hereafter.

Dimensions, &c.

Total length, with pole	†
Maximum width	†
Length between axles	†
Wheels { track	†
Wheels { diameter	†
Space required to turn in	†
Angle of lock	†
Upsetting angle (packed)	†
Rectangular space occupied in boats	†
Tonnage { for shipment	†
Tonnage { „ transport in boats	†

Weights.

(Packed.)

Wagon and limber	†
Wagon and limber { weight on two fore wheels	†
Wagon and limber { „ „ hind „	†
Wagon (perch on ground)	†
Limber	†
Weight at end of pole	†
Pressure of perch on ground	†

Wagon, Ammunition and Store, R.A., Mark II*.

(*Plate VII.*)

The body of this wagon consists of a framework formed by two sides, *a*, and two summers mortised into a front and rear, carbed, *b*. This framework is strengthened by plates riveted on the inside; it is housed and bolted to a front bolster, *c*, a cross bar, *d*, and a rear bolster, *e*. In front and rear of the front bolster, front and rear wheel bolsters, *f f*, are bolted to the summers, and to these three the upper wheel plate, *g*, is attached. The front bolster is shod with a friction plate, and is plated on the sides.

The body is supported over the hind axle upon two side stays of T-iron and a cross stay of round iron. Each side stay rests in an axle block of oak upon the shoulder of the axletree, where it is secured by axletree staples by a clip plate, and by the end of the cross stay, which latter serves as a coupling plate.

The frame is boarded over to form the bottom of the wagon, and movable sides, A, headboard, B, and tailboard, C, are fitted to it.

A locker is formed in front of the wagon body by a sliding partition. The lid of the locker is fitted with a raised box and driving seat, *k*, a back board, *l*, being hinged to it, and a footboard, *m*, to the headboard of the wagon. A small locker, *n*, is also formed between the summers underneath the rear of the wagon.

These wagons are now fitted with cranked guard irons, and the driver's seat is made slightly higher for convenience in driving with long reins. The footboard is increased in length and width, and fitted with a long toe piece, and further supported by iron stays fitted to its under side and to the front carbed.

The fore carriage of the wagon is formed of four futchels, *o*, housed in and bolted to a splinter-bar, *p*, and a cross-bar, *q*. An upper bolster, *r*, is bolted over, and an under bolster, *s*, beneath the centre of

† These particulars will be issued hereafter.

the futchels. A wheel plate is attached to the upper bolster, to the cross-bar, and to a small wheel bolster, *t*, placed in front. The upper bolster is shod with a friction plate, and both it and the lower bolster are strengthened by plates.

The frame of the fore carriage is supported over its axle in the same manner as the body over the hind axle.

The wagon is fitted for pole draught, which consists of a pole, bar supporting pole, two swingletrees, and two draught chains.

The body and fore carriage are connected by a main pin, which passes through bolster plates in the main bolsters, and is keyed beneath.

The footboard is of elm, the other boarding of yellow deal, and the remainder of the woodwork of the wagon of oak.

The fore wheels are 3-ft. 4-in. in diameter, the hind 5-ft. The axles are 2nd Class.

The wheels first issued with the wagons were—

fore, No. 33 } with wood naves.
hind, No. 32 }

Later issues of the wagons may be met with having—

fore, No. 28 }
hind, Nos. 25, 27, or 39 } with metal naves.

Nos. 28 and 39 wheels will only be issued to replace existing wheels of other Nos. as the latter become unserviceable.

The wagon is fitted to carry a spare fore wheel, a "pole, flag, distinguishing,"† intrenching tools, carbines, and swords, and a drag shoe with chain, &c. A locking plate, *u*, is attached beneath the frame to prevent the fore wheel injuring the latter in wheeling on rough ground.

The following articles belong to the wagon, namely, five bale hoops, *x*, a waterproof canvas cover with the lashing rope, bar stay, three lashing ropes, to secure the spare wheel, and drag shoe with chain and half-round grease tin.

The drag shoe is attached to a ram's horn hook fixed on the near side. The shoe, when not in use, is carried in a bracket on the side, and secured by straps. In the plate, the old manner of carrying it is shown.

The bale hoops are of ash, fitted with leather stops, and numbered from one upwards, commencing with the front hoop, a corresponding number being placed upon the wagon side at the upper staple for the bale hoop. The front hoop has also the register number of the wagon painted upon it.

The canvas cover is waterproofed, and has the register number of the wagon painted upon it.

The bar stay is of ash to fit from side to side, and keep the sides from spreading out when the wagon is packed and the tailboard down.

The extreme load is two tons.

Weights, &c.

Tonnage	for shipment..	4·659 tons.
	,, transport in boats	12·839 ,,
Rectangular space occupied in boats		11′ 4″ × 6′ 3″.
Upsetting angle		30°.
Angle of lock		103°.
Space required to turn in		23-ft. 7-in.
Weight		1 ton 0 cwt. 3 qr.

Note.—The stores carried in this wagon are laid down in the Tables of Equipment.

† This pole is issued for ammunition columns only.

Wagon, Artillery, Mark I*.

(Plate VII.)

The wagon consists of a light framed body, mounted on steel springs, with a lock under fore carriage.

The fore carriage is connected to the body by a ball and socket joint, which gives an easy movement to the wagon, and enables it to travel over rough ground without straining and twisting.

The wagon is fitted for pole draught which consists of a pole, a bar supporting pole, two swingletrees and two draught chains.

A driving seat (*a*) is provided, for use with pole draught. The front board is hinged to the body and is fitted with securing chains, to admit of its being turned down to form a footboard (*b*).

An auxiliary seat (*c*), which is placed across the wagon, is provided for convenience in carrying men, when the wagon is not fully loaded. Both seats are removable, and when not in use, are carried beneath the bottom of the wagon, where they are secured by suitable fittings.

Two removable partitions are supplied with each wagon; the front one and the front board form a locker; the hind one is intended to keep the load at the back of the wagon when it is not full, or to prevent the load slipping under the men's feet when the auxiliary seat is used.

When the front board is utilized as a footboard, the wagon sides are held in position by the front partition, the top corners of which are fitted with iron clips or hooks to grip the sides for this purpose.

The partitions which are retained in position by cleats fixed to the wagon sides can also be brought close together to form a front locker when the front board is turned down. When the rear partition is not required, it can be placed close up to the front one, or be carried in any position where most convenient.

A small trap door is let into the floor of the wagon to give access to a metal grease box which contains lubrication for the ball and socket joint. This box is fitted with a spring and plug which forces the grease down a tube to the joint. The box is covered with a screwed top, and this should be occasionally removed and the box replenished with grease, especially before proceeding on a long journey.

The axletrees are hollow steel tubes with 2nd Class arms. The outer faces of the drag washers are recessed, and the linch pins are made with a shoulder, which runs in the recess to obviate the use of linch pin ties. A slot is formed in the washer to allow of the withdrawal of the linch pin.

The wheels are 2nd Class Nos. 38 and 37; the hind wheel is 5-ft. in diameter, and the fore 3-ft. 6-in. They have $2\frac{1}{2}$-in. tyres and iron naves with 11-in. pipe boxes.

The wagon is fitted with floating raves, bale hoops, and the usual fittings for camp stores and intrenching tools.

Extra staples are fixed near the centre of the sides to carry the front bale hoops when long rein driving is resorted to, and small hooks (*dd*) are fixed on the rear part of the sides for the cover to be laced to so as to keep it clear of the wheels.

The wagon is fitted to carry a spare fore wheel on the under side at the rear; also a spare sub-division wheel by means of an axle arm which is fitted at the rear.

The sides and ends are removable, and the floating raves are jointed so that the whole can be conveniently packed for shipment.

The capacity of the wagon is 43 cubic feet, but the load must no exceed 15 cwt.

The wagon should be frequently examined to see that the fittings, working parts, &c., are in proper condition, and that all nuts and bolts which occasionally become loose through jolting are properly tightened up, especially before and during a march.

Special care in packing the load of the wagon is desirable. The contents should be closely packed; the bulkiest and lightest portion being over the front wheels, and the general weight of the load should be central between the sides.

Weights, &c.

Weight		14½ cwt.
Tonnage	for shipment	4·729 tons.
	,, transport in boats ..	14·308 ,,
Rectangular space occupied in boats ..		12′ 3½″ × 6′ 2½″ × 7′ 6″.
Upsetting angle..		29½°.
Angle of lock		119°.
Space required to turn in		29-ft. 2-in.

Note.—The stores carried in this wagon are laid down in Tables of Equipment.

General Instructions for Care and Preservation.*

Care should be taken that all nuts and screws are properly tightened up; if removed they should be slightly oiled before being replaced, and to prevent damage by the threads crossing a few turns should be given by hand before using the spanner.

On no account should a hammer be used in removing the nuts or screws.

All bright parts should be kept clean and slightly oiled to prevent rust, and such parts of the elevating gear of the carriage as are not in constant use should be coated with boiled linseed oil to preserve them from rust.

All working parts must be kept free from clotted oil and dirt, and properly lubricated.

When painting the carriage or limber especial care should be taken not to paint those surfaces over which motion, whether lineal or circular, takes place.

Before travelling, the wheels and axle arms should be freed from grit, the latter well greased, and all nuts properly screwed up with the spanners provided for that purpose.

Wheels.—Filling in pieces often require resetting and shortening, for the spokes shrink from back to front as well as across, and the filling in pieces, not shrinking in the direction of their length, prevent the flanges from going home on the spokes, causing a shaky wheel. When spokes shrink across, the tire must be tightened up.

Broken or damaged spokes should be replaced at once.

As the axletree arms and pipe-boxes wear, leather washers should be used at outer end of axletree arm. Steel or iron washers are bad for this purpose, as they increase the wear of the arm and of the end of the pipe-box. In India, or whenever a leather band is used round the pipe-box, on which the foot of the spokes rest, it should be examined when the wheel is re-tired, and removed if found hard and dry; it should be thoroughly soaked in oil.

* For detailed instructions as to method of carrying out repairs &c., *see* Handbook for Military Artificers.

In wheels of the double spoke pattern the "on" and "off" spokes are not interchangeable, and the feet of the spokes resting partly in sockets in the flanges and partly on the pipe-box, great care must be exercised that the slip-spoke is kept to its full length.

The limbers must always be parked with the pole on the ground, and great care must be taken in limbering up (when the horses are not harnessed in) that the pole is not allowed to rise above its horizontal position.

Projectiles.

(*Plates VIII and IX.*)

Description.	Diameter.		Length.	Bursting charge.		Weight filled and fuzed.
	Body.	Band or Studs.		Nature.	Weight.	
	inches.	inches.	inches.		oz.	lb. oz.
Shell, Shrapnel, Mark II	2·97	3·085	8·28	R.F.G.²	1¼	12 8
Shot, case „ III	2·9	†	8·5§	—	—	12 8

†Diameter over { front corrugations.. 2·96-in.
rear „ .. 3·08 „
§Length over handles .. .. .. 8·9 „

Shrapnel.

Mark II.—The body of the shell is of forged steel. Close to the base a groove is turned; three ridges project on the groove, and six axial chisel marks are cut across the ridges for a copper driving band (which is pressed into the groove round the shell), to impart rotation to the shell. The top of the body is recessed to receive the head.

The head of the shell is made of charcoal or Bessemer steel, struck with a radius of 1½ diameters, and is truncated and screwed to receive a gun-metal socket; the interior of the socket is bored and screwed to the G.S. taper.

In the base of the shell is fitted a sheet-iron (tinned) cup to contain the bursting charge. A steel disc rests on the shoulder in the bottom of the shell to support the metal balls; into the disc, screws the lower end of the central tube; its upper end being secured, after passing through the socket, by a gun-metal nut. The top of the tube is screwed internally to receive a primer.

The shell is lined with brown paper. A steel wire cage,* with steel disc attached, is inserted in the shell to contain the metal balls. The cage consists of 12 vertical wires soldered into the slots round the circumference of the steel disc; a piece of flattened iron wire is wound round the outside of the vertical wires in the form of a spiral.

The cage is fitted with 162 mixed metal balls, 35 to lb., the interstices being fitted with resin (any deficiency in the weight of the shell is made up with buck shot).

* In future manufacture tin cylinders will be used.

The head of the shell is fitted with a block of wood and felt washer; the head is attached to the body by screws and pins. A steel disc is placed in the head, over the balls.

The general form of the shell is shown on the Plate.

The shell should only be carried fuzed—

(*a*) On active service, when in the judgment of the battery commander, it is desirable to be prepared for immediate action.

(*b*) At practice camps when necessary for the rehearsal of (*a*).

It must be remembered that the fuzes when once taken out of their cylinders gradually deteriorate; shell should therefore not be fuzed earlier than is necessary.

Note.—On an emergency, a 15-pr. B.L. shell (*not charge*) may be fired from a 12-pr. B.L. 6 cwt. gun (75/12/5877). The M.V. with a 15-pr. shell is 1,478 f.s., and the pressure per square inch 16·075 tons.

Case Shot.

The case is made of sheet-tin, corrugated in three places, lap-jointed and soldered together.

The bottom is of sheet-tin, soldered to the sides of the case. A ring of sheet-iron is riveted to the bottom of the case, outside. The case has a lining of zinc (in three segments), and a disc of sheet-iron is laid at the bottom, loose, inside the lining.

The top is made of sheet-iron, tinned, and is fitted with an iron handle for lifting the shot.

The case contains 300 mixed metal balls, 34 to lb., the interstices being filled with an equal proportion of clay and sand.

Drill Shell.

The drill shell is made of cast-iron; it is smaller in diameter than the Shrapnel shell, and with a front copper band 6·25-in. from the base, to prevent the iron of the shell coming into contact with and injuring the bore. Both copper bands are plain, and are small enough to allow of the shell being rammed through the gun.

Fixing Plugs and Fuzes.

All shell for Field Service are issued filled; when, however, it is necessary to remove fuzes or plugs, they will be slightly lubricated (with Field's grease at home stations, and with black grease at stations abroad) before being replaced in the shell.

Distinguishing Marks.

Shrapnel shell is painted with a red tip, 1-in. deep, and being made of steel, they have also a white band, ½-in. wide, immediately below the red tip, and, when filled, a red band below the white one; "F.S." will be stamped on base of forged steel projectiles. The body of the shell is painted black, and the plug red.

Filled shell will be marked in red letters, ¼-in. long, as follows:—

(*a*) The monogram of the station, except when filled by the battery.

(*b*) The date of filling.

Projectiles which are to be used for practice only, will be marked with a yellow band, ½-in. wide, round the body.

Examination of Filled Shells.

The examination of filled shells will only be carried out by an Inspector of Warlike Stores. (For details, *see* Magazine Regulations.)

Fuze, Time, and Percussion, No. 56, Mark IV.

(*Plate X.*)

The fuze consists of the following parts, viz.:—Body, detonator plug with detonator, percussion pellet, spiral spring, base plug, safety pellet, brass ball, composition ring, dome, brass washer, cap, two safety pins, and two leather washers.

The *body* is made of gun-metal, screwed at the lower end to G.S. fuze hole gauge. It is bored from the bottom to receive a percussion pellet and base plug. Two holes are bored beyond the recess for percussion pellet, one for the detonator plug, the other for the safety pellet.

The *detonator plug* is made of gun-metal, screwed on the outside, and bored to receive a detonator.

The *detonator* is made of sheet copper, charged with 3½ grains of detonating composition; the centre hole in the bottom is covered inside with a brass disc. A tinfoil disc goes on the surface of the composition, and over it a copper disc with four perforations, which is secured by turning over the lugs on the edge of the detonator body. The hole bored for the detonator plug is continued above it to form a small magazine filled with F.G. powder. In the top of the body is bored a recess to contain a perforated pellet of pressed pistol powder, which communicates with the magazine by a hole, bored at right angles to the axis of the fuze. The stem on the body is screwed on top to take the cap, two grooves being cut in the top end of stem to receive the feathers on the brass washer. A groove is cut in the top face of body, close to the stem, and half way round it, and a gas-escape hole bored obliquely through the body into the groove. A small tablet of fine white paper is secured with shellac to the body of the fuze over the perforated powder pellet, and over it, two washers of fine white paper and calf-skin are secured with shellac, a hole being cut through the washers and tablet immediately over the powder pellet.

The *percussion pellet* is made of gun-metal, and has a slot cut in the side for the safety pellet and ball to fall into when set in action. A hole is made transversely through the pellet into which fits the brass retaining bolt, held in position by a brass spiral spring. The pellet contains a powder charge of F.G. powder. A small set screw, in the wall of the recessed interior of the body, fits into a slot cut in the percussion pellet to prevent it from turning in flight. A spiral spring, made of brass wire, is placed between the percussion pellet and detonator plug.

The *base plug* is made of gun-metal, with a conical hole bored in it, and closed at the bottom by a shalloon disc and brass washer spun in; it contains a perforated pellet of pressed powder, secured by a brass washer spun over on top.

The *safety pellet* is made of brass, and has a slot cut in the side to clear the brass ball. It is inserted in the body and suspended by a thin copper wire passing through holes in the fuze and pellet; the ends of the holes are closed by small lead plugs. A hole is also bored in the upper part of the pellet and body of fuze for the safety pin to pass through.

The *composition ring* is made of gun-metal, having a chamber on one side, and three projections on the inside to keep it concentric with the stem of the body. The chamber is bored and fitted with a hammer containing a steel needle, which is suspended by a copper wire over a patch of detonating composition. A safety pin also passes through the hammer and chamber. The composition ring has a groove turned on the underside and filled with composition, and this groove is connected with the hammer chamber by a lighting hole. The outside of the ring is graduated from 0 to 18, each division being sub-divided into halves and quarters, with a broad arrow at the point where the groove is interrupted by a bridge soldered in.

The *dome* is made of sheet brass.

The *washer* is also made of sheet brass, and fits over the top of the stem; it is to prevent the dome from turning and altering the setting of the fuze when screwing up the cap.

The *cap* is made of gun-metal, hexagonal in form, and screws on the stem of the body.

The fuze is stamped T on the composition ring close to the time safety pin, and P on the body close to the percussion pin.

If the fuze is required to act as a percussion fuze only, the P pin should be withdrawn and the T pin left in position; otherwise, both pins should be withdrawn.

It must be remembered that it is dangerous to move loaded guns if the T pins have been withdrawn from the fuzes.

The fuze should be set *before* the safety pins are withdrawn.

To set the time arrangement, the cap is loosened with the "key, fuze, universal," and the ring moved round until the graduation ordered is exactly in line with the arrow on the body; the fuze is then clamped by screwing down the cap as tightly as possible, care being taken that the ring and dome have even bearings.

The safety pins should not be withdrawn till the moment of loading.

Action.—On discharge, if the time safety pin has been withdrawn, the hammer sets down, shearing its suspending wire, and igniting the time ring, which burns until it comes over the hole in the leather and paper discs, when it ignites the pellet and so flashes down through the radial magazine, detonator pellet, and base plug, and into the shell.

If the percussion pin has been withdrawn, the safety pellet sets down, shearing the suspending wire, the brass ball falls down into the space over the safety pellet. The centrifugal bolt, owing to the rotation of the shell, releases the percussion pellet, which, on impact, flies forward and ignites the detonator, which flashes through the percussion pellet and base plug into the shell.

Charges.

(*Plate XI.*)

Weight.	Nature.	Mark.	
$12\frac{7}{16}$ oz.	Cordite, size 5.	I.	Service.
1 lb.	Blank, L.G.[1]	—	Saluting.

The service cartridge consists of a bundle of $12\frac{7}{16}$ oz. of size 5 cordite, length 5·5-in., tied in three places with silk twist, and enclosed in a shalloon bag.

Each end of the cartridge is primed with 4 drams of R.F.G.[2] powder, secured between two discs of shalloon, which are sewn on to the ends of the bag.

Length of cartridge	6·2-in.
Diameter of cartridge	2·2 „

The saluting charge is 1 lb. blank (L.G.) in a cartridge of No. 1 silk cloth, choked with silk twist, hooped with two silk braids, and with a silk braid loop attached to the bottom for removing it from the gun, if necessary.

Length	4·7-in.
Diameter	3·0 „

Drill Cartridge.

The cartridge is made of a block of wood, covered with raw hide. The cartridge is weighted by means of a piece of lead, placed in a hole bored in the centre to such a depth that the lead weight will be in the middle of the cartridge, and the hole filled by a piece of wood.

Length	6·2-in.
Diameter	2·2 „

Note.—Batteries practising either with blank cartridges or projectiles should leave their drill shell and cartridges in camp or barracks.

The tampeon is not to be placed in the gun except in the gun park.

Tubes.

T Friction Tube, Mark I.

(*Plate XII.*)

The form and general dimensions of the tube are shown on the Plate, and consists of the following principal parts:—Body (*a*), head (*b*), ball (*d*), plug (*e*), friction wire (*f*).

The head is of gun-metal, the body of solid-drawn brass, the ball of soft copper, and the friction bar of double copper wire, the bight being formed into a loop and the ends twisted together and roughened. A hole in the head of the tube over the friction wire is charged with about 2 grains of detonating composition, in the form of a paste, laid over the roughened part of the friction wire. A gut skin disc (*g*) is placed over the composition, and a shellacked cork plug (*h*) inserted over the disc, the hook being fitted up flush with shellac cement. The body is charged with 8 grains of pistol powder, and is closed with a shellacked cork plug (*h*) covered with shellac cement.

A brass pin (*c*) is inserted to prevent the body becoming unscrewed. The upper part of the body has a central perforation, which is enlarged in its lower part into a conical recess. The ball (*d*) is placed in this recess, and is retained therein by a screwed plug (*e*) pierced by three fire holes.

On the withdrawal of the friction bar the detonating composition is ignited, and the flash, passing down the perforation in the head and through the plug, fires the powder charge. The ball is driven upwards by the explosion and seals the tube. This, together with the mode in which the tube is held in the special vent employed with it, prevents the rush of gas through the vent.

The body is lacquered inside and outside.

The tubes are issued in square tin boxes, 10 in a box. Both the top and bottom of the box are removable, being secured by soldered bands, and the tubes are so arranged that five may be withdrawn from the top and five from the bottom.

Note.—Tubes, after firing, are to be returned to Woolwich to be repaired and refilled; they should be immersed in mineral oil within 24 hours after firing, for which purpose ½ gallon of oil per 100 tubes—of which 2 oz. ($\frac{1}{10}$ *pint*) would be used up in the treatment—is allowed.

T Friction Tube, Drill, Mark I.

(Plate XII.)

The drill tube is made of hardened steel, of the same external shape as the Service tube. The head of the tube is grooved to receive a hardened steel spring, which is attached in the groove by a screw from the underside of the head. The end of the spring is bent down to nearly meet the bottom of the groove, which is raised to form a jaw through which the hook of the lanyard can be drawn by a pull of about 50-lb.

Total length of both tubes 1·9-in.

Range Table for 12-pr. B.L. Gun of 6 cwt.

Based on Practice of 10.12.95.

Minute 40.754.

Charge, { weight, $12\frac{7}{16}$ oz. / gravimetric density, $\frac{90 \cdot 05}{0 \cdot 307}$. / nature, cordite, size 5.

Projectile, { nature, Shrapnel shell. / weight, $12\frac{1}{2}$ lb.

Muzzle velocity $\frac{1,523}{1,553}$ f.s.

Nature of mounting, travelling, field.

Jump, + 26 minutes.

Remaining velocity.	5 minutes elevation or deflection alters point of impact		Deflection for drift (Telescopic sight).	Slope of descent.	Elevation.	Range.	Fuze scale for time and percussion fuze. Mark IV.	50 per cent. of rounds should fall in			Time of flight.
	Range.	Laterally or vertically.						Length.	Breadth.	Height.	
f.s.	yds.	yds.	° ′	1 in.	° ′	yds.		yds.	yds.	yds.	secs.
1477	50	0·14	...	343	−0 18	100	$\frac{1}{4}$	17	0·14	0·05	0·21
1432	50	0·29	...	171	−0 8	200	$\frac{1}{2}$	17	0·14	0·11	0·48
1390	50	0·43	0 1	118	0 2	300	1	17	0·14	0·16	0·72
1348	50	0·58	0 1	88	0 10	400	$1\frac{1}{4}$	17	0·14	0·21	0·96
1309	50	0·72	0 1	71	0 19	500	$1\frac{1}{2}$	17	0·14	0·25	1·20
1270	49	0·87	0 1	59	0 28	600	$2\frac{1}{4}$	18	0·15	0·32	1·45
1235	49	1·01	0 2	49	0 38	700	$2\frac{3}{4}$	18	0·16	0·40	1·70
1200	49	1·16	0 2	43	0 49	800	3	19	0·18	0·47	1·95
1168	48	1·31	0 2	37	0 59	900	$3\frac{1}{4}$	19	0·20	0·56	2·20
1137	48	1·45	0 3	33	1 09	1000	$3\frac{1}{2}$	20	0·24	0·64	2·45
1108	47	1·60	0 3	29	1 19	1100	$4\frac{1}{4}$	20	0·23	0·74	2·71
1080	46	1·74	0 3	26	1 29	1200	$4\frac{3}{4}$	20	0·33	0·85	2·98
1059	45	1·89	0 3	23	1 40	1300	5	21	0·38	0·97	3·24
1039	44	2·03	0 4	21	1 51	1400	$5\frac{1}{2}$	21	0·44	1·09	3·51
1022	43	2·18	0 4	19	2 03	1500	6	22	0·50	1·22	3·78
1006	41	2·32	0 4	17	2 15	1600	$6\frac{1}{2}$	22	0·57	1·35	4·05
990	40	2·47	0 5	16	2 28	1700	$6\frac{3}{4}$	23	0·64	1·51	4·34
975	39	2·61	0 5	14	2 41	1800	$7\frac{1}{4}$	23	0·72	1·66	4·63
961	37	2·76	0 5	13	2 54	1900	$7\frac{3}{4}$	24	0·81	1·82	4·92
947	36	2·91	0 6	12	3 08	2000	8	24	0·90	2·00	5·22
933	35	3·05	0 6	11	3 22	2100	$8\frac{1}{4}$	25	1·00	2·23	5·52
920	34	3·20	0 6	11	3 36	2200	$8\frac{3}{4}$	26	1·11	2·46	5·83
907	33	3·34	0 7	10	3 51	2300	$9\frac{1}{4}$	27	1·22	2·70	6·14
894	32	3·49	0 7	9·2	4 06	2400	$9\frac{3}{4}$	28	1·34	3·03	6·45
881	31	3·63	0 8	8·7	4 22	2500	$10\frac{1}{4}$	29	1·45	3·36	6·78
869	30	3·78	0 8	8·1	4 39	2600	$10\frac{3}{4}$	30	1·58	3·70	7·11
857	29	3·92	0 9	7·6	4 56	2700	$11\frac{1}{4}$	32	1·69	4·30	7·46
846	29	4·07	0 9	7·1	5 14	2800	$11\frac{3}{4}$	35	1·66	4·93	7·81
834	28	4·21	0 10	6·7	5 32	2900	$12\frac{1}{4}$	39	1·62	6·75	8·16
823	28	4·36	0 10	6·3	5 50	3000	$12\frac{3}{4}$	54	1·57	8·57	8·52
813	27	4·51	0 11	6·0	6 09	3100	13	60	1·52	10·0	8·89
803	26	4·65	0 11	5·6	6 28	3200	$13\frac{1}{4}$	67	1·46	11·9	9·27
793	26	4·80	0 12	5·3	6 48	3300	$13\frac{3}{4}$	73	1·40	13·7	9·66
783	25	4·94	0 12	5·0	7 09	3400	$14\frac{1}{4}$	78	1·35	15·6	10·06
773	24	5·09	0 13	4·7	7 30	3500	$14\frac{3}{4}$	82	1·30	17·2	10·47
763	24	5·23	0 13	4·5	7 51	3600	15	86	1·26	18·8	10·88
753	23	5·38	0 14	4·3	8 13	3700	$15\frac{1}{4}$	88	1·22	20·4	11·32
744	22	5·52	0 14	4·1	8 36	3800	...	90	1·19	21·7	11·77
735	22	5·67	0 15	3·8	9 00	3900	...	91	1·16	23·0	12·22
726	21	5·81	0 16	3·6	9 25	4000	...	92	1·19	24·4	12·68
717	21	5·96	0 16	3·5	9 50	4100	...	93	1·23	26·2	13·16
708	20	6·11	0 17	3·3	10 15	4200	...	93	1·29	28·1	13·64
699	20	6·25	0 17	3·2	10 41	4300	...	94	1·37	29·9	14·13
690	19	6·40	0 18	3·0	11 8	4400	...	95	1·47	31·7	14·62
681	19	6·54	0 19	2·9	11 34	4500	...	95	1·57	33·4	15·12
672	19	6·69	0 20	2·8	12 01	4600	...	96	1·69	35·1	15·62
664	18	6·83	0 20	2·6	12 28	4700	...	96	1·81	36·9	16·12
656	18	6·98	0 21	2·5	12 56	4800	...	97	1·93	38·8	16·62
648	18	7·13	0 22	2·4	13 24	4900	...	97	2·05	40·7	17·14
640	17	7·27	0 23	2·3	13 52	5000	...	98	2·17	42·6	17·66
632	17	7·42	0 24	2·3	14 20	5100	...	98	2·29	43·8	18·18
624	17	7·56	0 25	2·2	14 48	5200	...	99	2·41	45·0	18·70

SECTION GUN DRILL.

Battery gun drill, which does not vary with the equipment, is given in "Field Artillery Drill."

The following paragraphs give the duties of the detachments at the section commander's orders.

Single detachments should be accustomed to drill as if forming part of a section, and the instructor should therefore always use the orders given for the section commander.

On dismounted parades the detachment will form "Detachment Rear" where it is laid down for them to mount, and Nos. 6, 7, 8 and 9 will attend to the limber, Nos. 6 and 7 pushing in rear, 8 and 9 at the pole.

ARRANGEMENT.

THE DETACHMENT—
- To tell off.
- Detachment rear.
- To form detachment rear in action.
- To take post from detachment rear in action.
- To move the gun with drag ropes.
- " " without "

GENERAL DUTIES—
- Wagon supply.
- Casualties.
- Details of duties.
- Signals.

PREPARATION FOR ACTION.

ACTION.

TO FIRE—
- Miss-fire.

TO LOAD.

MAGAZINE FIRE.

CASE

TO STAND FAST.

TO CEASE FIRING.

TO LIMBER UP.

INDIRECT LAYING—
- One aiming post.
- Two " posts.

MOUNTING AND DISMOUNTING—
- To dismount the gun and carriage.
- To mount " "

THE DETACHMENT.

The detachment consists of nine numbers who fall in two deep, one pace between ranks, No. 1 on the right of the front rank.

To Tell Off.

Section Commander.	*No.* 1.
.... Section—Tell off.	

At the order from the section commander—No. 1 numbers 1; the right hand man of the rear rank numbers 2; the right hand man of the front rank, 3; the second man from the right of the rear rank, 4; his front rank man, 5; and so on.

Detachment Rear.

Formed as above, 3 yards in rear of the gun wheels, No. 1 covering the off wheel.

To Form Detachment Rear in Action.

Section Commander.	*No.* 1.
.... Section—Detachment Rear.	No. .... Double March.

At the order from the section commander—No. 1 doubles to his place and gives the order, "Double March."

At the order from the No. 1—The numbers double into their places on the left of No. 1, each halting as he reaches his place.

To Take Post from Detachment Rear in Action.

Section Commander.	*No.* 1.
.... Section—Take Post.	No. .... Double March.

At the order from the No. 1—All the numbers double to their places.

TO MOVE THE GUN WITH DRAG ROPES.

Section Commander.	*No.* 1.
.... Section—With Drag ropes, Prepare to advance.	

At the order from the section commander—Nos. 2 and 3 hook the drag ropes to the gun wheel washers, the two highest numbers go to the pole, and the remainder man the ropes.

TO MOVE THE GUN WITHOUT DRAG ROPES.

Section Commander.	*No.* 1.
.... Section—Without Drag ropes, Prepare to advance.	

At the order from the section commander—Nos. 2 and 3 push between the muzzle and wheels, Nos. 4 and 5 man the gun wheels, the two highest numbers go to the pole, and the remainder assist.

GENERAL DUTIES.

No. 1 commands, attends to the handspike, sees that the time fuzes have been set correctly, rams home, and lays for direction.

No. 2 attends to the brake, shell pocket and vent, fires, and mans the wheel.

No. 3 attends to the brake, shell pocket, and breech, supplies himself with ammunition, sets time fuzes during ranging, shows them to No. 1, takes out safety pin or pins, loads and mans the wheel.

No. 4 lays for elevation and lifts at the handspike in running up or back.

No. 5 fills the portable magazines, loosening the nuts of time fuzes during ranging, and setting them after that is completed.

No. 6 supplies No. 3 with ammunition in the portable magazines, fills up the shell pockets and assists No. 5.

Except when it is otherwise ordered, the numbers work on their own sides of the gun, even numbers on the right side, odd numbers on the left.

WAGON SUPPLY.

One wagon for each section is brought up as detailed in Field Artillery Drill.

As soon as the wagon halts the Nos. 5 of the two guns of the section go to the wagon body and issue ammunition to their respective guns as above detailed.

The numbers brought up on the wagon first unhook the wheel horses, and then perform the duties detailed for No. 6 to the two guns of the section—the numbers on the off side of the wagon to the right gun, those on the near side to the left gun. If there are six numbers with the gun, no men should be sent up on the wagon.

At standing gun drill without wagons Nos. 7, 8 and 9 stand 5 yards in rear of the limber.

Casualties.

The captain is responsible for the replacement of casualties as directed in Field Artillery Drill. Section commanders order such changes of duties in their detachments as they consider necessary. If the full detachments cannot be maintained the duties are divided as follows:—

With five numbers—No. 2 supplies No. 3 with ammunition, in addition to his other duties.

With four numbers—No. 2 performs the duties of Nos. 5 and 6 No. 4 performs the duties of Nos. 2 and 4.

Details of Duties.

No. 1.

No. 1 is responsible for the entire service of his gun.

While in action he will pay particular attention to the following points:—

That the gun is in the general alignment of the battery.

That the shell pockets are filled up and that their lids are kept closed and fastened.

Should it be necessary for No. 1 to leave his place, No. 2 will perform his duties at the handspike in addition to his own duties.

Should a case arise in which it is desirable that No. 1 should lay, he will perform the duties of No. 4 with the addition of "Commands and sees that the time-fuzes have been set correctly," No. 4 performing No. 1's duties with the above exceptions.

No. 1 lays for direction by looking along the line given by the elevating screw, cam lever, and muzzle, while standing at the end of the handspike, not by looking over the sights. When, however, great accuracy of line is of importance the laying for direction will be done by No. 4, in which case No. 1 will traverse according to No. 4's signals.

No. 1 only gives the words of command shown for him; he does not repeat the section commander's orders. His executive orders should be no louder than is necessary for his subdivision to hear.

No. 2.

No. 2 must stand clear of the layer when Scott's sights are used.

No. 3.

No. 3 opens and closes the breech as follows:—

To Open the Breech.—He takes hold of the cam lever with his right hand, raises it to its full extent, draws it towards him as far as it will go, and folds it down and then throws the breech open.

To Close the Breech.—He takes hold of the cam lever with his right hand, raises it to its full extent, and swings the breech-screw round until the carrier ring is flush against the breech of the gun. Still keeping the lever raised he then pushes the screw home and then forces the lever from him as far as it will go and folds it down.

No. 3 supplies himself with ammunition from the portable magazine or, if one has not been brought up, from the shell pocket; he places the cartridge under his left arm until he has loaded the shell.

No. 4.

No. 4 must keep the gun layed for elevation whether loaded or not; he must remember to look over the sights after the loading is completed, to see that the gun has not been shifted. He must always *depress* last.

As a general rule the whole of the laying for direction will be done by No. 1, but when great accuracy of line is of importance No. 4 will lay for direction also, using the signals given below.

No. 6.

No. 6 must take the first opportunity after coming into action of filling up the shell pockets if any rounds have been taken from them; he must do this without interrupting the service of the gun.

As a general rule only one portable magazine should be at the gun at a time, so that if change of fuze, &c., is ordered, it may be immediately carried out by Nos. 5 and 6.

Note.—On no account should a fuze without a safety pin be placed in any ammunition box.

SIGNALS.

Nature.	By whom given.	Meaning.
Hand raised	No. 4	My gun is layed.
Motions with either hand in the required direction, arm well back ..	No. 4*	Trail right, or left.
Drops his hand	No. 4*	Halt (traversing).
Points to the vent with his right hand	No. 1	Make ready.

PREPARATION FOR ACTION.

Section Commander.	*No. 1.*		
....Section—Prepare for Action.	No.	Percussion Load.	Shrapnel

At the order from the section commander—The detachment dismount, and—

No. 1 sees that the bore is clear, gives the order to load, superintends the other numbers, and reports to the section commander.

No. 2 fills the tube pocket, places a tube in the vent, examines the brake and fills the shell pocket, removing the covers from the cartridges.†

No. 3 removes the breech cover‡ and straps it on the axle, examines the breech fittings, loads (ramming home himself), sees that the fuze key is in its pocket on the tensile stay, examines the brake and fills the shell pocket, removing the covers from the cartridges.†

No. 4 removes the cover of the Scott's sight bracket and straps it on the tensile stay, and examines the sights and elevating gear.

* Only when great accuracy for line being required the laying for direction is done by No. 4.

† At drill the covers need not be removed from the cartridges.

‡ In very sandy soil the battery commander may order the breech covers to be left on.

No. 5 sees that the fuze key is in its pocket and examines the limber boxes.

The wagon numbers supply Nos. 2 and 3 each with two rounds of Shrapnel and one round of case from the wagon body, see that the fuze keys are in their pockets, and examine the wagon boxes.

On the completion of the above the detachment mount without further order.

The numbers detailed to "examine" the various ammunition boxes see that they are properly filled, and that the fuzes of all shrapnel are set at "2";* also that the lids open easily and the locks are in good order. Any deficiencies in the limber boxes are filled up from the wagon body under the direction of the No. 1.

The lanyards of all the fuze keys should be attached to the leather loops inside the fuze key pockets.

If the order "*Scott's Sights*" is given, No. 4 takes the case containing the Scott's sight out of the box on the limber, and slings it over his shoulder. He puts it back at "Cease firing."

If the section commander orders "*Without Loading—Prepare for Action*," or, "*With Case—Prepare for Action*," the duties are carried out with the necessary alterations.

ACTION.

Section Commander.	*No. 1.*
....Section—Action Front.	No. .... Action Front.

At the order from the No. 1—

The detachment dismount and No. 3 unkeys, and with No. 2 lifts the trail; when the trail is clear of the hook, No. 3 gives "Limber drive on."

Nos. 2 and 3 carry the trail round half a circle to the left, No. 2 shifting round the trail eye to avoid walking backwards, and lower it to the ground.

Nos. 4 and 5 man the wheels.

The limber moves as detailed in Field Artillery Drill.

As soon as the trail has been lowered to the ground—

No. 1 points out the target to No. 4, ships the handspike, and lays for direction.

No. 2 puts on the brake, takes the lanyard out of the tube pocket and holds it with the hook in his left hand, the extractor in his right.

No. 3 puts on the brake.

No. 4 sets his sight as ordered, and lays for elevation. As soon as the gun is layed he holds up his hand.

No. 5 fills the portable magazines with Shrapnel, loosening the nuts of the fuzes.

No. 6 assists No. 5, and takes a portable magazine up to the gun as soon as one is ready, placing it near No. 3 but clear of the recoil.

The positions of the numbers are as follows—

No. 1 one yard in rear of the trail eye.

Nos. 2 and 3 close to and facing the breech.

No. 4 on the right of the trail eye.

No. 5 in rear of the limber on the off side.

No. 6 in rear of the limber on the near side.

Action right, left, or rear is the same except that at—

Action Right.—The trail is carried round a quarter of a circle only.

Action Left.—The trail is carried round a quarter of a circle to the right, No. 3, in this case, shifting round the trail eye.

---

* Only when shell are carried fuzed. (*See* page 23.)

Action Rear.—The trail is not carried round.

The limbers in all cases move as detailed in Field Artillery Drill.

TO FIRE.

No gun is ever to be fired without an *order* from the No. 1; and the No. 1 must never give this order until he has received the order from the section commander and seen that the gun is in proper condition.

Section Commander.	*No. 1.*
Fire No.... Gun.	Points to the vent. No.... Fire.

At the order from the section commander—No. 1 steps clear of the recoil to the left and points to the vent with his right hand.

At this signal from the No. 1—

No. 2 hooks the lanyard to the tube, steps outside the wheel, and stands facing to the front, holding the lanyard tight with his right hand, the forearm across the body, and the elbow so bent that the hand is level with the vent.

Nos. 3 and 4* step clear of the recoil.

As soon as he sees No. 2 ready and the other numbers clear, No. 1 gives the order, "No.... Fire."

At this order from the No. 1—No. 2 slews his body to the right, and thus fires the gun; he then places the lanyard round his neck, the hook end hanging down on his left side, the extractor on his right.

Directly the gun stops in its recoil it is run up to its previous position without any order—

No. 1 assists if he considers it necessary.

Nos. 2 and 3 man the wheels.

No. 4 lifts at the handspike.

As soon as the gun is run up—

No 1 lays for direction.

No. 2 takes out the tube and puts in a new one.

No. 3 opens the breech and supplies himself with a fresh round of ammunition.

No. 4 lays for elevation.

In addition, when using drill ammunition without further order—

No. 1 forces the drill shell through the bore with the handspike as soon as No. 3 has removed the drill cartridge.

No. 3 removes the drill cartridge as soon as he has opened the breech and hands it to No. 6.

No. 6 doubles up, picks up the drill shell, receives the drill cartridge from No. 3 and returns them to the limber or wagon.

Miss-fire.

If there is a miss-fire Nos. 2 and 3 go round to the front of the axletree, No. 3 holds up the cam lever while No. 2 takes out the old tube and puts in a fresh one, both taking care not to disturb the gun. No. 2 hooks the lanyard to the tube and they return to their places, No. 2 resuming his position.

* When using Scott's sights, No. 4 must remove the sight before stepping clear. Until new pattern sights are issued he must also do this with the tangent sight.

TO LOAD.

Section Commander.	*No. 1.*
.... Section—Shrapnel Fuze .... Load.*	No..... Shrapnel Fuze .... Load.*

At the order from the No. 1—

No. 2 takes the lanyard from round his neck and holds it ready, the hook in his left hand, the extractor in his right.

No. 3 sets the time fuze (when ranging), shows it to No. 1, takes out the safety pin or pins and places the shell in the bore.

As soon as he sees that No. 3 is ready to load—

No. 1 takes the handspike in the centre with his left hand back up, withdraws it from the socket, cants it over unshod end next the gun, meeting it with his right hand back up, takes a pace to the front with his left foot, and placing the unshod end against the shell rams it gently home: then *keeping the handspike against the shell* he applies his whole force to ensure its being true home. He then steps back and replaces the handspike in the socket.

As soon as the shell has been rammed home—

No. 3 places the cartridge in the chamber and closes the breech.

MAGAZINE FIRE.

Section Commander.	*No. 1.*
.... Section—Magazine Fire.	

At the order from the section commander—

No. 4 lays for elevation by placing two fingers over the tangent sight† which is run down in the socket.

The guns are reloaded with shrapnel fuze 2 as soon as fired, without any further order.

Nos. 5 and 6 supply No. 3 with single rounds of shrapnel fuze 2, from the limber or wagon.

The gun is not run up between rounds unless necessary.

No. 3 should not show the time fuzes to No. 1.

CASE.

Section Commander.	*No. 1.*
.... Section—Case.	

This is exactly the same as above, substituting case for shrapnel fuze 2.

TO STAND FAST.

Section Commander.	*No. 1.*
.... Section—Stand Fast.	

At the order from the section commander—

All stand fast whatever they are doing, except that No. 2 unhooks the lanyard if it is hooked to the tube, and that if a safety pin has been taken out, No. 3 places the shell in the bore.

At the order "Go on" the work is continued.

---

* Or "Percussion Shrapnel Load."

† As in most cases the left tangent sight will be already run down in the socket, time will be saved by using it.

TO CEASE FIRING.

Section Commander.	*No.* 1.
....Section—Cease Firing	No. .... Percussion Shrapnel Load.

At the order from the No. 1—

The guns are loaded and each number, *as soon as he has performed his share of the loading*, proceeds as follows:—

No. 1 straps the handspike on the trail.

No. 2 takes off the brake, puts the lanyard into the tube pocket, and sees that the shell pocket is properly shut.

No. 3 takes off the brake and sees that the shell pocket is properly shut.

No. 4 places the Scott's sight (if it is in use) in its case, and returns the case to the box on the limbers.

Nos. 5 and 6 strap the portable magazines in their places without removing any ammunition that may be in them.

If the section commander orders "*Without loading—Cease firing*," or "*With case—Cease firing*," the duties are carried out with the necessary alterations.

Note.—If for any reason it is impossible to fire the guns at "Cease Firing," the battery commander may order the cartridges to be withdrawn, and the shell left in the bore.

TO LIMBER UP.

Section Commander.	*No.* 1.
....Section—Front, Limber Up.	

At the order from the section commander—

Nos. 2 and 3 carry the trail round half a circle to the right, No. 2 shifting round the trail eye to avoid walking backwards, and lower it to the ground.

Nos. 4 and 5 man the wheels.

As soon as the trail is lowered the numbers get under cover.

No. 1 in front of No. 2.

Nos. 2 and 3 between breech and wheels.

Nos. 4 and 5 between muzzle and wheels.

Nos. 6 and 7 in front of Nos. 4 and 5.

The whole with their backs to the axletree.

The *limber* comes up as detailed in Field Artillery Drill, and No. 1 gives "Halt, limber up."

At the order from the No. 1—

Nos. 2 and 3 lift the trail and place it on the hook.

No. 3 keys up.

Nos. 4 and 5 man the wheels.

On the completion of the above the detachment mount without further order.

Right, left, or rear limber up is the same except that at—

Right Limber Up.—The trail is carried round a quarter of a circle only.

Left Limber Up.—The trail is carried round a quarter of a circle to the left, No. 3 in this case shifting round the trail eye.

Rear Limber Up.—The trail is not carried round.

The limber, in all cases, moves as detailed in Field Artillery Drill.

INDIRECT LAYING.

Aiming posts should be issued in pairs of the same colour, the right guns of sections having red, the left blue. They should be planted with their coloured sides towards the guns, except when, owing to light, &c., the section commander orders the white side.

ONE AIMING POST.

Section Commander.	*No.* 1.
....Section—One Aiming Post.	

At the order from the section commander—

No. 1, standing at the end of the handspike, directs No. 4 by signal to plant his aiming post in line with the target.

Nos. 2 and 3 mark on the ground the position of the wheels.

No. 4 doubles out about 50 yards to the front with one aiming post, which he plants as directed by No. 1; he then doubles back and gets out his clinometer.

At "Go on" the firing is continued, the gun being layed for direction on the aiming post, and for elevation by clinometer.

When the target cannot be seen by the No. 1 dismounted, the section commander will direct whether he should mount or stand up on the limber.

TWO AIMING POSTS.

Section Commander.	*No.* 1.
....Section—Two Aiming Posts.	

At this order from the section commander, which is given when the battery is halted under cover, previous to occupying a position by the deliberate method.

No. 4 gets out his clinometer and aiming posts.

As soon, then, as the battery commander gives the signal (*see* Field Artillery Drill), the section commanders and layers fall out in the usual way, but each layer carries his two aiming posts and clinometer instead of sights.

The battery commander, after pointing out the target, shows the position of the front post of the directing gun; the layers of the remaining guns extend along the alignment and plant their front posts at the interval ordered.

Each layer, as soon as he has planted his front post, doubles a short distance to the rear, and plants his second post in line with the target and the front one. He then takes up a position for his gun out of sight of the target and in line with his two posts, looking to the directing gun for his dressing.

The section commanders see that the layers are properly placed before they double back to the battery.

The Nos. 1 bring their guns into action in line with the two posts, and Nos. 2 and 3 mark on the ground the position of the wheels.

After the first round the gun is layed for direction on the near aiming post only.

MOUNTING AND DISMOUNTING.

This should only be practised at the annual course of military training, and then only sufficiently for instruction: every care must be taken that the equipment is not injured.

To Dismount the Gun and Carriage.

Section Commander.	*No.* 1.
Dismount No..... Gun and Carriage.	No..... Prepare to Dismount the Gun. Dismount the Gun. Dismount the Carriage. Lift—Lower.

At the order "Prepare to Dismount the Gun"—

No. 1 removes the sights, disconnects the elevating gear, runs it up and throws it back, and mans his handspike.

Nos. 2 and 3 unkey the capsquares, remove the drag shoe, &c., and man the wheels.

Nos. 4 and 5 double two drag ropes and make fast the bights with a reef knot, half under and half over the breech, just in rear of the sight sockets; the running ends are then passed outside the tire of the wheels on the same level as the breech, two turns taken round the felloe, one on each side of a spoke to prevent slipping, and made fast with a half hitch, blackwalling against the tire. Nos. 4 and 5 then man the wheels.

Nos. 6 and 7 bring up the drag ropes to Nos. 4 and 5, and man the wheels.

Nos. 8 and 9 bring up the spare handspike, place it in the bore and man it.

At the order "Dismount the Gun"—

Nos. 8 and 9 lift the gun clear of the trunnion holes and keeps it horizontal.

Nos. 2 and 3 raise the capsquares, Nos. 2, 4, and 6; 3, 5, and 7, man the wheels forward until the gun is lowered to the ground. No. 1 raises the trail off the ground until the trunnions are clear; as soon as the gun is clear of the trunnion holes Nos. 2 and 3 should lower the capsquares to prevent jamming.

At the order "Dismount the Carriage"—

Nos. 2, 3, 4, and 5 go to the carriage: Nos. 2 and 3 in rear, 4 and 5 in front.

Nos. 6, 7, 8, and 9 go to the wheels: Nos. 6 and 7 in front, 8 and 9 in rear.

Nos. 8 and 9 take off the linch pins and washers.

At the order "Lift"—The carriage is lifted and the wheels taken off.

At the order "Lower"—The wheels are placed on the ground dish down, and the carriage is lowered to the ground.

To Mount the Gun and Carriage.

Section Commander.	*No.* 1.
Mount No..... Gun and Carriage.	No..... Mount the Carriage. Lift. Prepare to mount the Gun. Mount the Gun

This is exactly the opposite to the dismounting just described.

Nos. 2 and 3 do not raise the capsquares until the trunnions are about 6 in. from them. This is to allow the jacket to drop in roar without jamming.

Note.—Limbers and wagons are mounted and dismounted in a similar way, the poles having been previously removed.

DISABLED ORDNANCE.

Whenever operations are not described in detail or numbers are not told off to particular duties, the No. 1 will order such duties to the several numbers as may be required.

To Replace a Damaged Wheel.

Should a gun wheel be disabled in action, it should be immediately turned so as to bring the sound part on to the shoe, and, if necessary, lashed, and notice should be sent to the captain.

The latter will immediately send up another wheel, which will be brought alongside the damaged one, and the wheels changed as follows:—

Section Commander.	*No. 1.*
No..... Change Wheels.	No..... Change Wheels. Lift. Lower.

At the order "No. ..... Change Wheels" from the No. 1—

Nos. 1 and 6 go to the damaged wheel, No. 1 in rear. No. 6 removes the linch pin and washer.

Nos. 2, 3, 4, and 5 man the traversing handspike, which is placed under the axletree by No. 2 or 3 (according to side).

At the order "Lift"—

The axletree is lifted and the damaged wheel is taken off. No. 6 rolls it out of the way, and the new wheel is put on by the numbers who have brought it up.

At the order "Lower"—

The carriage is lowered, the linch pin and washer put on by No. 6, the handspike replaced by No. 2 or 3, and all resume their duties in action.

The damaged wheel is either left on the ground or removed by the numbers who brought up the new one, as the captain may have directed.

To Remove a Gun and Carriage by a Limber.

The gun is dismounted, the horses taken out; the limber is run over the gun so that the breech is towards the pole, and the trunnions under the limber hook; the muzzle and the pole are raised, and the gun slung with a drag rope round the trunnions to the limber hook; the end is passed to the front, and the muzzle borne down, a half hitch taken round the breech, and made fast to the futchels.

The carriage is dismounted. It is then lifted, trail first, up the front of the limber on to the top front of the box, until the weight is balanced for draught.

The trail is secured by the drag chain to a handspike in the bore, the wheels are placed, dish down, on the top of the carriage, securely

lashed with drag ropes to the futchels and limber hook in rear and to the footboard in front.

To Remove a Gun and Carriage by a Wagon.

The gun is slung to a limber as before. The carriage is lifted by all the numbers on to the wagon body until the trail eye nearly touches the limber box; it is secured to the perch by the drag chain. The wheels are placed, dish down, on the top of the carriage, and lashed.

METHOD OF DRILLING RECRUITS.

General Remarks.

Many good recruits are acquainted only with the commonest English words, and as their duties and the material they have to use are altogether new and strange, instructors should be careful—

To use the simplest language possible.

To explain, as they occur, all technical terms.

To illustrate descriptions by means of a piece of chalk or otherwise, and in all cases to render clear the object of the various duties.

Not to attempt to teach recruits elaborate descriptions, exact measurements, &c., which they do not understand.

To avoid needless repetitions, or wearying the men by keeping them for a long time at one thing; the drill should be varied by short descriptions (avoiding manufacturing details), setting fuzes, &c.

To bring men forward by successive steps, by explaining a position and then doing it; for instance, when commencing recruits' gun drill, the instructor should himself show how a duty should be performed and then cause every man in turn to do that duty (make every man do No. 1's duty, then every man No. 2's, then No. 4's, and so on). When each man knows the duties of each post separately, the numbers who work and move together should be instructed after the manner described below, before commencing gun drill in quick time.

Great patience is necessary on the part of the instructor. He must make allowance for the different capacities of the recruits, and squads should periodically be arranged, so that the intelligent soldier may reap the advantage of his work, and not be kept back by those of inferior ability. Recruits, as they progress, should be called out in turn to drill, for this gives a man confidence, helps him to learn, and causes him to take an additional interest in his work.

The instructor should place himself where he can be seen and heard by all in the squad; should stand in a smart, soldier like attitude, and should avoid pacing up and down, looking down on the ground, turning his back on the squad, and similar habits, which have the effect of fidgeting the men and distracting their attention.

His explanation should be given in a distinct voice; his word of command should be sharp and decisive.

Stress is laid on the above points because men unconsciously imitate their instructor. A first-rate instructor will make a good detachment: his manner and style are therefore of the first importance.

The utmost alertness of attitude and smartness of movement should be enforced throughout gun drill.

The instructor can at any time ascertain that each number is at his post by proving. This he does by calling out, *Prove your numbers —No. 1, No. 2, &c.* The man called upon raises his right hand and extends it smartly to the front, hand open, thumb uppermost, hand as high as the shoulder. When the next number is called he drops his hand. The last number lowers his hand at the word "*Down.*"

If at at any time the instructor wishes to change the numbers, he gives the order, "*Change Rounds.*" On this, No. 1 becomes 9; 9, 8; 8, 7; 7, 6; 6, 5; 5, 4; 4, 3; 3, 2; 2, 1.

The following is only an example of how the drill should be taught; the details of the other operations should be divided up in a similar manner.

To Fire.

At the order "*Fire No. .... Gun,*" from the section commander—

No. 1 steps clear of the recoil to the left, and points to the vent with his right hand.

At that signal—

No. 2 hooks the lanyard to the tube, steps outside the wheels, &c.

Nos. 3 and 4 step clear of the recoil.

No. 1—"Fire No. .... Gun."

As soon as No. 1 sees No. 2 ready, and the other numbers clear, he gives "No. .... Fire."

At that order—

No. 2 slews his body to the right, and thus fires the gun; he then places the lanyard round his neck.

"*Go on.*"

Next explain that directly the gun has ceased recoiling it is run up to its previous position without any further order.

No. 1 assists if he considers it necessary.

Nos. 2 and 3 man the wheels.

No. 4 lifts at the handspike.

Nos. 1, 2, 3 and 4—"Go on."

Next explain—

As soon as the gun is run up—

No. 1 lays for direction.

No. 2 takes out the tube and puts in a new one.

No. 3 opens the breech, and supplies himself with a fresh round of ammunition.

No. 4 lays for elevation.

Nos. 1, 2, 3 and 4—"Go on."

Next give—

In addition, when using drill ammunition, without further order, the gun must be unloaded.

No. 3 removes the drill cartridge.

No. 1 forces the drill shell through the bore, &c.

No. 6 doubles up, picks up the drill shell, receives the drill cartridge from No. 3, and returns them to the limber or wagon.

Nos. 1, 3 and 6—"Go on."

To Load.

At the order "*Shrapnel fuze — Load,*" from the section commander—

No. 1 gives the order to his detachment—

No. .... "*Shrapnel fuze—Load.*"

No. 2 takes the lanyard from round his neck and holds it with the hook in his left hand, the extractor in his right.

No. 2—"*Load.*"

No. 3 sets the time fuze (during ranging only, after that is completed it is set by No. 5), shows it to No. 1, takes out, &c., &c.

No. 3—"*Load.*"

Next give—

As soon as No. 1 sees that No. 3 is ready to load, he takes the handspike, &c.

No. 1—"*Go on.*"

Next give—

No. 3, as soon as the shell has been, &c., &c.

No. 3—"*Go on.*"

List of Stores.

Carriage.

Description.	No.	Where carried.
Carriage, B.L., 12-pr., 6-cwt.. ..	1	
Bits, vent, 11-in.	1	Right ammunition pocket.
Brushes, breech..	1	In upper trail box.
Buckets, water, G.S., leather	2	On breast chain rings.
Cans, oil, lubricating, No. 9	1	In lower trail box.
Caps, sponge, No. 6	2	On cleaners.
Cleaners { piasaba	1	On left tensile stay.
Cleaners { wool	1	On right tensile stay.
Covers { breech	1	On breech of gun.
Covers { telescopic sight bracket ..	1	On sight bracket.
Hammers, claw, 20-oz.	1	In upper trail box.
Handspikes, traversing, No. 2 ..	1	On top of trail.
Keys, fuze, universal	1	In pocket on left tensile stay.
Oil, Rangoon .. .. .. pint	½	In oil can.
Pincers, carpenters' .. .. pairs	1	In upper trail box.
Posts, aiming	2	On left bracket.
Pockets { key, fuze, universal ..	1	On left tensile stay.
Pockets { tube, special	1	On left side bracket.
Rimers, vent, T.	1	On right ammunition pocket.
Rods, vent, 11-in.	1	„ „ „
Shoes, drag, No. 7	1	On breast of carriage.
Spanners, McMahon, 15-in.	1	In upper trail box.
Spanners, No. 93	1	On right bracket.
Tampeon	1	Strapped on right side of axletree, when not in gun.

Limber. (Carriage and Ammunition Wagon.)

Axes { felling	1	Under foot-board.
Axes { pick { heads, 6½-lb.	1	„ limber.
Axes { pick { helves, 34½-in.	1	„ „
Blankets, G.S.	2	On top of box.
Boxes, fuze { No. 20	2	In compartment of limber box.
Boxes, fuze { „ 21	1	In compartment of limber box.
„ grease, 3-lb.	1	Rear of axletree, "off" side.
„ obturating pads..	1	In compartment of limber box.
„ sight, telescopic	1	On platform board, "near" side.
Brushes, water, carriage	1	Under limber, "near" side.
Buckets, water, G.S., leather	2	„ „
Cans, oil, lubricating, No. 3	1	Rear of axletree, "off" side.
Cases, can, lubricating, No. 3.. ..	1	„ „ „ „
„ carbine	2	On carbine
Cartouches	2	In limber box.
Cartridges, 12 1/16-oz., cordite, size 5 ..	44	„ „
Clamps, tangent, sight {	2	1 in "off" and 1 in "near" holdall, gun limber.
Clamps, tangent, sight {	1	In "near" holdall, wagon limber.
Couples, trace	2	In "off" holdall.
Covers, cartridge	44	On cartridges.
Discs, pad, { adjusting	1	In compartment, limber box.
Discs, pad, obturating { protecting	1	In compartment, limber box.
Drivers, screw, G.S., 4-in.	1	In "off" holdall.
Fuzes, time and percussion, No. 56 ..	44	In fuze boxes.
Grease, Field's .. .. .. lb.	3	In grease box.
Hooks, bill	1	Under limber, "off" side.
*Keys, fuze, universal	2	In pockets in rear of box.
„ spring lock	2	In pocket rear of limber box.
Kettles, camp, oval, 12 quarts ..	1	Under limber, "near" side.
Lanyards, friction tube, T.	2	In "rear" holdall.
Levers, cam	1†	In compartment, limber box (wagon).
Magazines, portable	2	In rear of limber box.
Oil, Rangoon .. .. .. pint	1	In oil can.
Pads, obturating	1	In compartment, limber box
Pins, linch, 2nd class, split	1	In "off" holdall.
Rimers, vent, T..	1	In "near" holdall.
Ropes, drag, light .. .. pairs	1	On platform board.
Shells, Shrapnel	42	In limber box.

* When guns are parked, the fuze keys will be placed in holdalls in limbers.

† 1 per section.

List of Stores—*continued.*

LIMBER—*continued.*

Description.	No.	Where carried.
Shot, case	2	In limber box.
Sights, fore {	2	In "off" holdall, gun limber.
Sights, fore {	1	In "off" holdall, wagon limber.
„ tangent {	2	1 in "off" and 1 in "near" holdall, gun limber.
„ tangent {	1	In "near" holdall, wagon limber.
„ telescopic	1*	In telescopic sight box.
Spades, N.P.	2	One on each side of limber box.
Straps, securing, 1″ × 44″ (camp kettle lids)	1	On lid of kettle.
Swingletrees, No. 10	1	On platform boards.
Tubes, T, friction	50	In compartment, limber box.
Vents, T, axial	1	„ „ „
Washers, drag, 2nd class, C	1	Under platform board, "near" side.
„ „ „ with Q ..	1	„ „ „ "off" „
Wrench, breech mechanism A ..	1	In "near" holdall.
AMMUNITION WAGON.		
Blankets, G.S.	2	On top of ammunition box.
Bolts, stop	1†	In holdall, spare parts of gun.
Boxes, fuze, No. 20	3	In ammunition box.
„ grease, magazine, 14-lb. ..	2	Rear of axletree.
Cap, sponge, No. 4	1†	On sponge.
Cartouches	2	In ammunition box.
Cartridges, 12 7/16-oz. cordite, size 5 ..	48	„ „
Cases, saw, hand	1	In front of ammunition box.
„ pocket tube	1	„ „ „
Collars, actuating	3	In holdall, spare parts of gun.
Covers, cartridge	48	On cartridges.
Cutters, wire	1	Front of ammunition box, "off" side.
Fuzes, time, and percussion, No. 56 ..	48	In fuzes boxes.
Grease, Field's .. .. .. lb.	28	In grease boxes.
Handspikes, common, 6-ft.	1	Under perch.
„ traversing, No. 2	1	„ „
Holdalls, needles, and silk twist ..	1	In "off" holdall.
„ spare parts of gun	1	In compartment, ammunition box.
Jacks, lifting, G.S.	1	On platform board.
Kettles, camp, oval, 12-qts.	2	Under wagon.
Keys, fuze, universal‡	2	In pockets in rear of box.
„ powder case	1	In "off" holdall.
„ spring lock	2	In pocket, rear of ammunition box.
Knives, clasp	1	In "near" holdall.
Lashings, tarred, 1-in., 10-ft.	2	On axletree.
Magazines, portable	2	In rear of wagon.
Mauls, G.S.	1	Under wagon.
Needles, magazine, nickle silver, 4-in.	2	In holdall, needles and silk twist.
Pins, keep, bolt elevating	2	In holdall, spare parts of gun.
„ „ hinge, bolt carrier ring ..	2	In holdall, spare parts of gun.
Pocket, tube, L.S.	1	In case, tube pocket.
Posts, picket, 2½-ft.	6	Under wagon.
Saws, hand, 26-in.	1	In front of ammunition box.
Scissors, magazine .. .. pairs	1	In "near" holdall.
Shell, Shrapnel..	46	In ammunition box.
Shot, case	2	„ „
Shoes, drag, No. 7	1	On perch.
Silk twist .. .. .. oz.	2	In holdall, needles and silk twist.
Sponges, R.M.L., 13-pr., jointed ..	1†	Under perch.
Springs, catch, retaining, vent, axial ..	2	In holdall, spare parts of gun.
„ clip, „ carrier ring..	2	In holdall, spare parts of gun.
„ stud, catch, left	2	In holdall, spare parts of gun.
„ „ „ right	2	In holdall, spare parts of gun.
„ retaining, fore sight	4	In holdall, spare parts of gun.
Strap, tube box, long	1	In tube pocket.
Tubes, friction, T	50	In compartment of ammunition box.
„ „ T, drill	1	In "near" holdall.

* 1 on each carriage limber and 1 spare with No. 1 sub-division wagon limber.
† 1 per battery.
‡ When guns are parked, the fuze keys will be placed in holdalls in limbers.

Description.	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply.	For what Purpose.	Where carried.
Woolwich Store Charge, No. 4.				
Staples, round, crowned, small	6	2	Wagons, Ammunition, and Store and Artillery	Forge limber.
Ties, linchpin	15	..	.. ..	Store limber.
Woolwich Store Charge, No. 8.				
Wire, copper, 15 W.G., soft .. .. lbs.	1 (60 ft.)	½ (30 ft.)	Repairs to side arms, &c... ..	Store limber.
Woolwich Store Charge, No. 9.				
Copper, hoop .. .. feet	30	..	General repairs to woodwork ..	Store wagon.
Solder, tinman's .. .. bars	6	..	Tinwork	No. 2 drawer, smiths' tool chest.
Spelter, brass .. .. lbs.	¾	..	Brazing	
Woolwich Store Charge, No. 10.				
Chain, weldless link, No. 8 W.G. .. .. .. yds.	1	1	Repair to suspending chains ..	Forge wagon limber.

Nails	copper wrought	rose head, strong, No. 451	lbs.	2	1½		
		tacks, No. 473	„	2	1		
	steel	brad, wrought, No. 26	„	1	½		
		tacks, Flemish black, No. 192	„	1	½		
		clout, wrought, countersink head, strong, No. 104	„	1½	½		
		clasp, wrought, fine, No. 72	„	2	½		
		clasp, wrought, strong, No. 80	„	2	½		
Screws, iron	flat head	3-in. gauge, No. 16		48	..	General repairs	No 3 drawer, wheeler-fitters' tool chest.
		2½ „ „ 16		24	..		
		2 „ „ 14		24	6		
		1½ „ „ 13		36	..		
		1 „ „ 12		36	..		
		¾ „ „ 10		36	8		
		¾ „ „ 13		36	8		
		⅞ „ „ 8		36	4		
	round head, 1¼-in. gauge, No. 13			24	..		
Screws, looped, No. 3, flat				5	1	Wagons, Ammunition, and Store and Artillery wagons	
Staples	lashing, riveting, $\frac{3}{16}$-in.			10	2	Securing side-arms	Forge limber.
	„ with plate, single box			4	..	Ammunition boxes	Forge limber.

Woolwich Store Charge, No. 11.

Borax, refined	lb.	½	..	Brazing	No. 2 drawer, smiths' tool chest.
Glue, best town made	„	1	..	..	Forge limber.
Oil, linseed, boiled†	pints	..	4	Elevating gear, and working parts of carriage.	
Paint, lead, white	ozs.	8	8	Lettering batteries and painting discs of aiming posts	Forge limber.
Paint, blue, ultramarine (dry)	„	2	2	Painting discs of aiming posts	Forge limber.
Paint, red, Chinese	„	2	2		
Resin, black	lb.	½	..	Tinwork	No. 2 drawer, smiths' tool chest.
Salammoniac, in lumps	„	½	..		
Turpentine, spirits of	pints	¼	¼	Lettering batteries	Forge limber.

* Carried as convenient. † 2 pints of this oil allowed for station equipment.

Description.	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply. *	For what Purpose.	Where carried.
Woolwich Store Charge, No. 13.				
Blocks, wood, securing projectiles, limber, near, set of 9 .. .. sets	1	½	.. ..	Store wagon.
Blocks, wood, securing projectiles, limber, off, set of 9 .. .. .. „	1	½	.. ..	Store wagon.
Blocks, wood, securing projectiles, wagon body, near, set of 7 .. .. „	1	½	.. ..	Store wagon.
Blocks, wood, securing projectiles, wagon body, off, set of 7 .. .. „	1	½	.. ..	Store wagon.
Boards, platform, ammunition wagon, front, B.L., 12-pr., 6-cwt. ..	1	..		
Boards, platform, limber, B.L., 12-pr., 6-cwt.	1	..		
Bolts, with nuts, countersink head, ½-in. × 2-in.	6	..	Footboards	No. 3 drawer, wheelers' tool chest.
Bolts, with nuts, hexagon head, ½-in. × 1⅛-in.	6	..	.. ..	No. 3 drawer, wheelers' tool chest.
Bolts, with nuts, nave, 2nd Class, C, No. 35 wheel, bevelled head	1	1	.. ..	No. 3 drawer, wheelers' tool chest.
Bolts, with nuts, nave, 2nd Class, C, No. 35 wheel, square „	1	1	.. ..	No. 3 drawer, wheelers' tool chest.
Bolts, with nuts, nave, 2nd Class, C, „ 36 „	2	2	.. ..	No. 3 drawer, wheelers' tool chest.
Chain, iron, 1¼-lb. per yard	1¼	..	Tailboards	Forge limber.
Forges, field, handles, lever, Mark IV	1	..	.. ..	Forge wagon (Mark II only).
Forges, field, Screws, cheese, head, $\frac{3}{16}$-in. × $\frac{7}{16}$-in. (set of 8)†	1	..	.. ..	No. 3 drawer, wheelers' tool chest.
Forges, field, Screws, hexagon head, ¼-in. × $\frac{5}{8}$-in. (set of 9)†	1	..	.. ..	No. 3 drawer, wheelers' tool chest.
Hooks, brake shoe	1	..		
Hooks, drag shoe and chain	1	..		
Hooks, hooks, wire rope and drag chain	1	..	.. ..	Store wagon.
Hooks, draught, limber	2	..		

Iron, pieces	angle, 2-ft., 8-in. × 2-in. × ¼-in.	1	1	General repairs		Store wagon.
	bolt, 2-ft. 8-in. × $\frac{7}{16}$-in.	1	..			
	bolt, 2-ft. 8-in. × $\frac{5}{8}$-in.	1	..			
	bolt, 2-ft. 8-in. × ½-in.	1				
	bolt, 2-ft. 8-in. × ¼-in.	1	..			
	flat, 2-ft. 8-in. × 3-in. × 1-in.	1	1			
	flat, 2-ft. 8-in. × 2-in. × ¾-in.	1	..			
	flat, 2-ft. 8-in. × 6¼-in. × ½-in.	1	1			
	flat, 2-ft. 8-in. × 2-in. × ⅜-in.	1	..			
	plate, 1-ft. 6-in. × 6-in. (W.G. No. 12)	2	..			
	tire, 12-in. × 2½-in. × ½-in.	2	2			
Keys	iron, guard iron with chain and loop	4	..	.. ..		Forge limber.
Keys	spring lock	2	..	.. ..		Forge limber.
Keys	„ flat, pin, pole, with chain	2	..	.. ..		Forge limber.
Leathers, hand		4	..	.. ..		Store wagon.
Locks, spring, box, ammunition		1	1	.. ..		Forge limber.
Pins, pole, limber pole		3	3	.. ..		„ „
Plates, camp kettle, B.L., 12-pr., 6 cwt.		2	..	.. ..		Store wagon.
Rivets	steel, boss head, $\frac{7}{16}$-in. × 1⅛-in.	36	6	Movable steels		No. 3 drawer, wheelers' tool chest.
Rivets	steel, boss head, $\frac{7}{16}$-in. × ¾-in.	48	6			
Rivets	steel, conical head, ⅜-in. × 3-in.	30	4			
Soles, drag shoe	No. 3	4	2	.. ..		Store wagon.
Soles, drag shoe	No. 5	6	3	.. ..		Store wagon.
Steel, pieces	atlas, square, 1-ft. 4-in. × 1¼-in.	1	..	General repairs		Store wagon.
Steel, pieces	cast, round edge, 1-ft. 4-in. × ⅛-in. × ¾-in.	1	..			
Steel, pieces	tire, 12-in. × 3-in. × $\frac{9}{16}$-in., curved	2	..	Ring tires		
Steels, movable	limber hook	6	3	.. ..		
Steels, movable	trail eye, or perch	6	3	.. ..		

* Carried as convenient.

† Field Forge, Mark IV only.

Description.	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply. *	For what Purpose.	Where carried.
Woolwich Store Charge, No. 13—continued.				
Straps, securing: 1½-in. × 30-in.	1	..	Drag-shoe ammunition wagon ..	Store wagon.
1-in. × 44-in.	3	..	Camp kettle lids, portable magazines	
1-in. × 32-in., B.P.C.B.	6	..	For blankets	
1-in. × 30-in.	4	2	Maul head, drag-rope and swingletree	
1-in. × 26-in.	4	..	Case for grease box, swords and picket posts on forge and store wagons	
1-in. × 22-in.	2	..	Spades	
1-in. × 22-in., D.L.	2	..	Handwheel..	
1-in. × 18-in.	2	..	Pickaxe and tampeon	
1-in. × 13-in.	6	..	Pickaxe, washers, drag, bill-hook, water brush, and spanner, No. 93	
1-in. × 13-in. (with piece)	2	..	Hankspike on trail	
1-in. × 10-in.	2	..	Camp kettle handles	
¾-in × 6-in.	4	..	Box, Scott's sight	
¾-in × 13-in.	4	..		
¾-in × 10-in.	2	..	Posts, aiming	
Turnbuckles, box, under wagon	4	..	.. ..	Forge limber.

Woolwich Store Charge, No. 14.

Keys, split, round, loop	$\frac{3}{8}$-in. × $2\frac{3}{4}$-in.	4	2	.. ..	No. 3 drawer, wheelers' tool chest.
	$\frac{5}{16}$-in. × $2\frac{1}{4}$-in.	12	6		
	$\frac{5}{16}$-in. × $1\frac{3}{4}$-in.	12	6		
	$\frac{5}{16}$-in. × $1\frac{1}{4}$-in.	12	6		
	$\frac{1}{8}$-in. × $1\frac{1}{4}$-in.	6	6		
	$\frac{1}{4}$-in. × $3\frac{1}{4}$-in.	12	6		
	$\frac{1}{4}$-in. × $2\frac{1}{4}$-in.	12	6		
	$\frac{1}{16}$-in. × $\frac{3}{8}$-in.	12	6		
Pins, steel, taper, gear elevating		3	1	.. ..	

Woolwich Store Charge, No. 19.

Felloes	No. 35 wheel, ordinary	3	1	.. ..	Store wagon.
	No. 35 wheel, slip	2	1	.. ..	
	„ 36 „ ordinary	1	—	.. ..	
	„ 36 „ slip	1	—	.. ..	
	„ 37 „ ordinary	1	1	.. ..	
	„ 37 „ slip	1	1	.. ..	
	„ 38 „ ordinary	1	1	.. ..	
	„ 38 „ slip	1	1	.. ..	
Spokes	No. 35 wheel, back	3	1	.. ..	
	No. 35 wheel, front	3	1	.. ..	
	„ 36 „	2	—	.. ..	
	„ 37 „	1	—	.. ..	
	„ 38 „	1	1	.. ..	

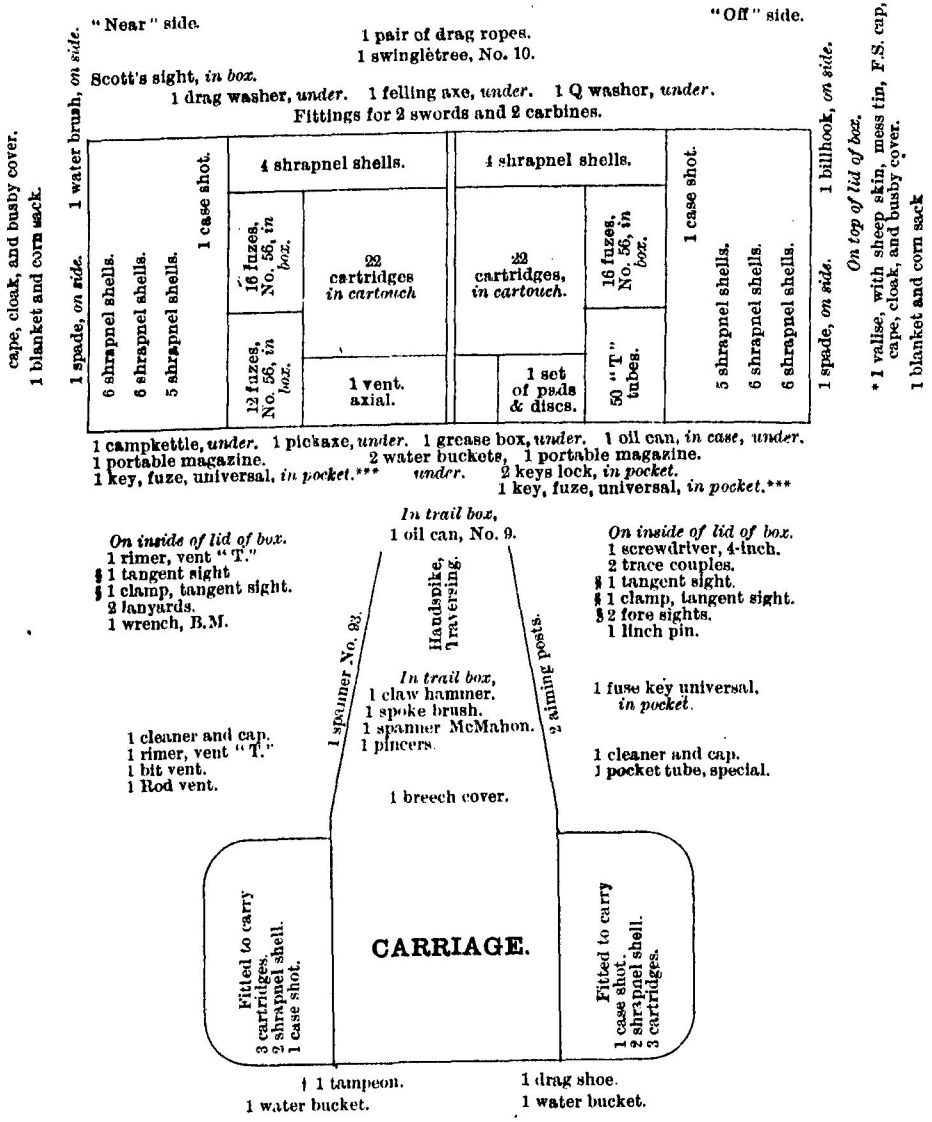
* Carried as convenient.

LONDON:
Printed for Her Majesty's Stationery Office,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
Printers in Ordinary to Her Majesty.

(Wt. 14187 1000 11 | 96—H & S 5208)

12-PR. B.L. 6-CWT. EQUIPMENT CARRIAGE AND LIMBER.

LIMBER.

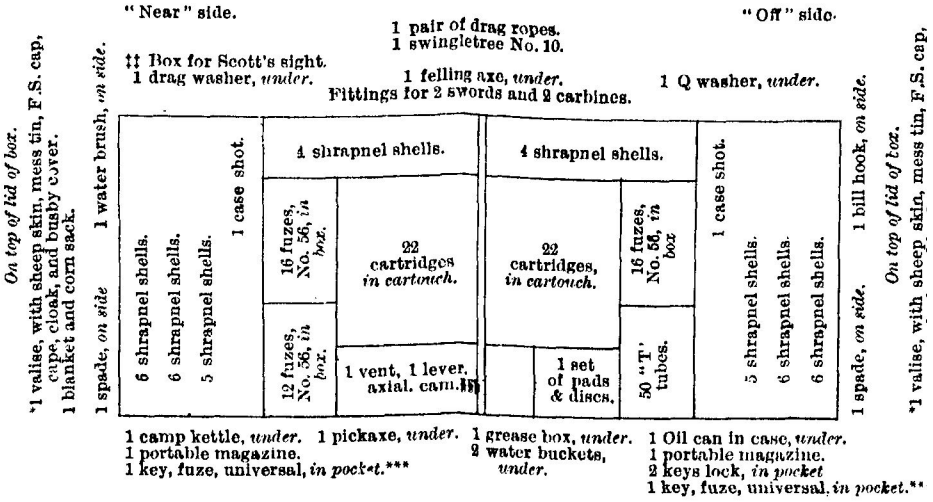


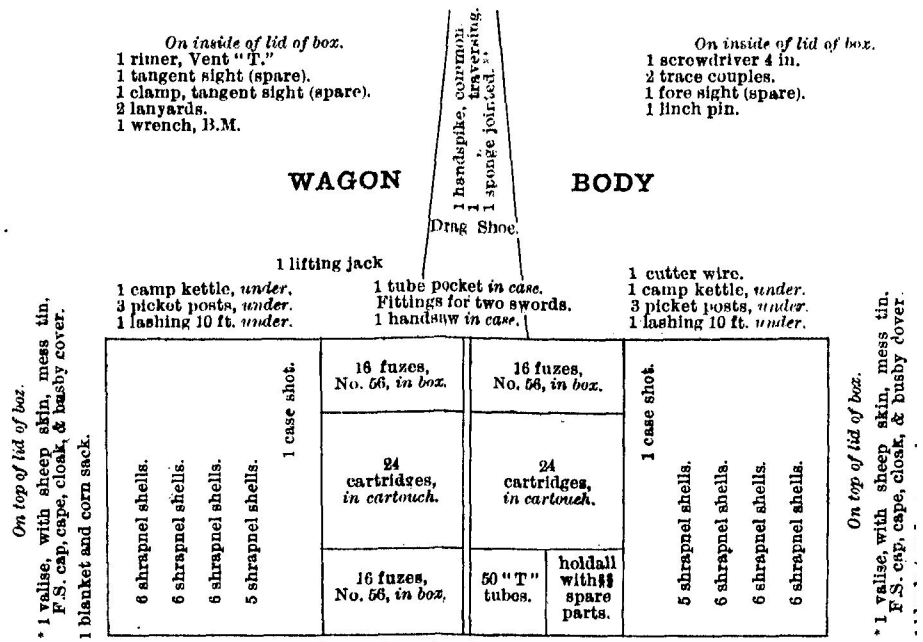
§ When not in gun.

† Strapped to axletree, when not in gun.

12-PR. B.L. 6-CWT EQUIPMENT WAGON AND LIMBER.

LIMBER.





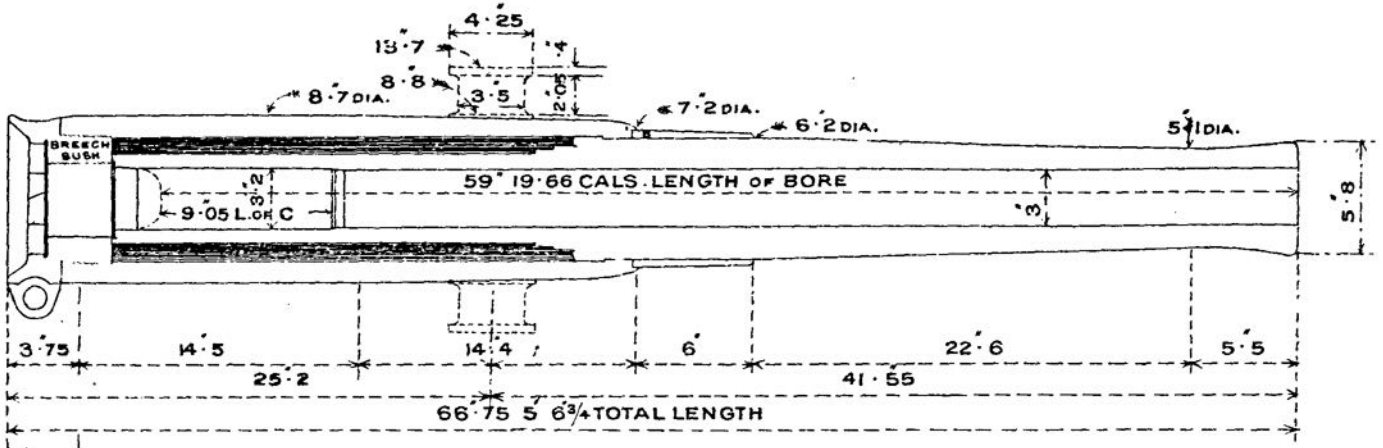
**1 per battery.

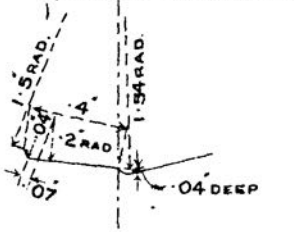
†† 1 spare sight per battery, with No. 1 subdivision.

§§ 1 bolt, stop, 3 collars, actuating, 2 pins, keep, carrier ring.

ORDNANCE, B.L. 12-PR., 6 CWT.

— SCALE 1/10. —



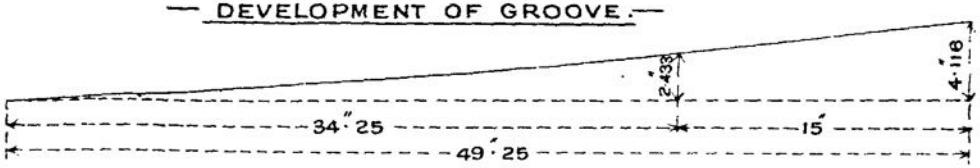


SECTION OF GROOVE

FULL SIZE

Nº OF GROOVES 18.

— DEVELOPMENT OF GROOVE. —



RIFLING A UNIFORMLY INCREASING TWIST FROM 1 TURN IN 105 CALIBRES AT BREECH END OF RIFLING TO 1 TURN IN 28 CALS. AT 15" FROM THE MUZZLE. THE REMAINING 15" BEING UNIFORM AT 1 TURN IN 28 CALS.

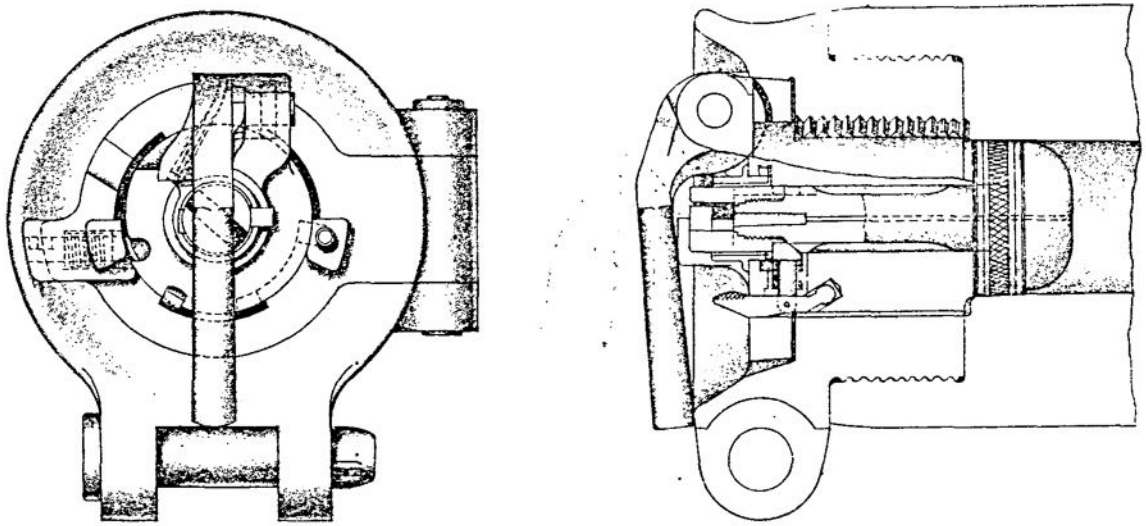
Plate I.

W. MAN & Sons, Ltd. Lith. 8299. 4.96.

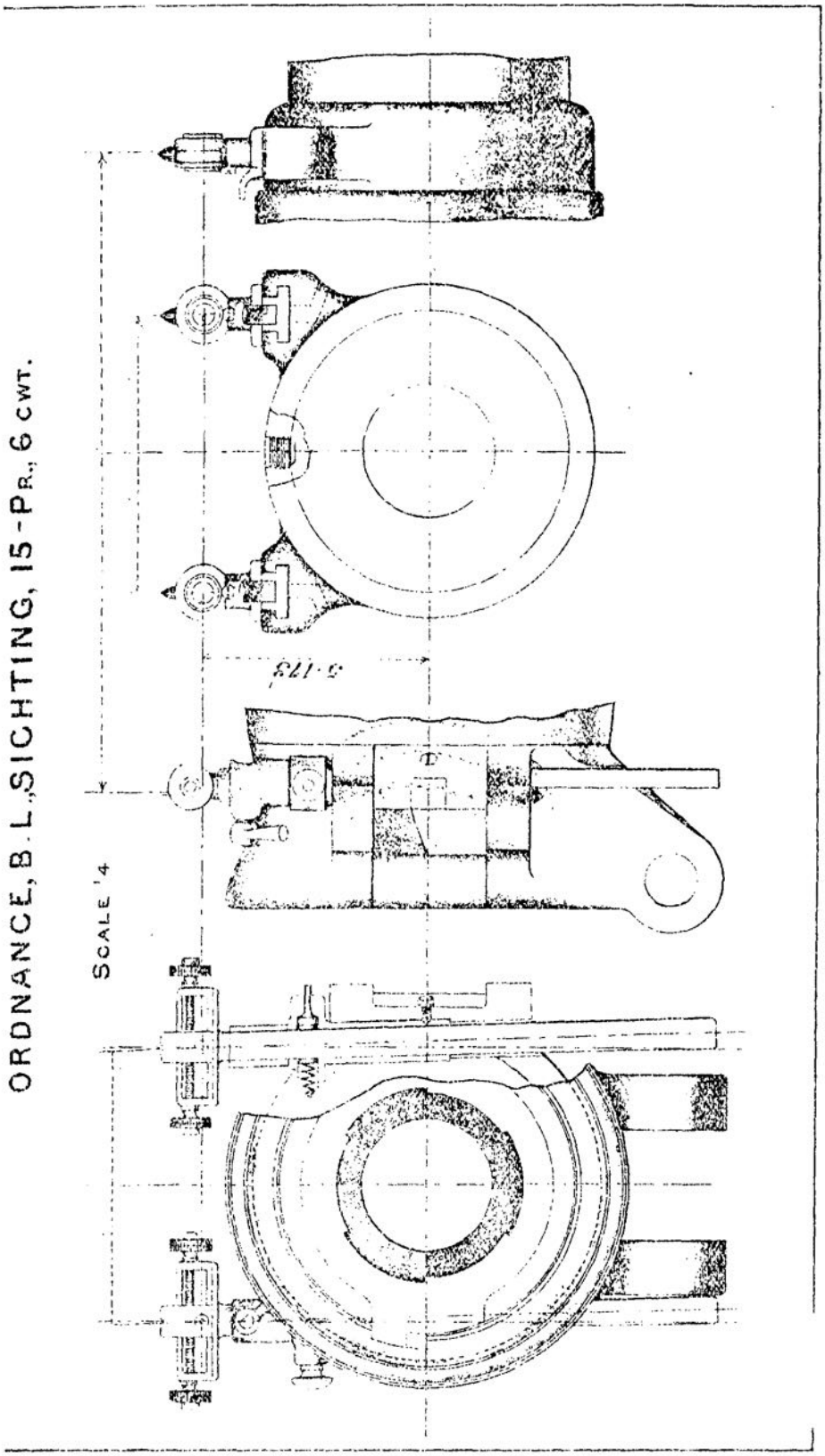
ORDNANCE., B.L., 12-Pr., 6-CWT.

GENERAL ARRANGEMENT OF BREECH MECHANISM

SCALE 1/4

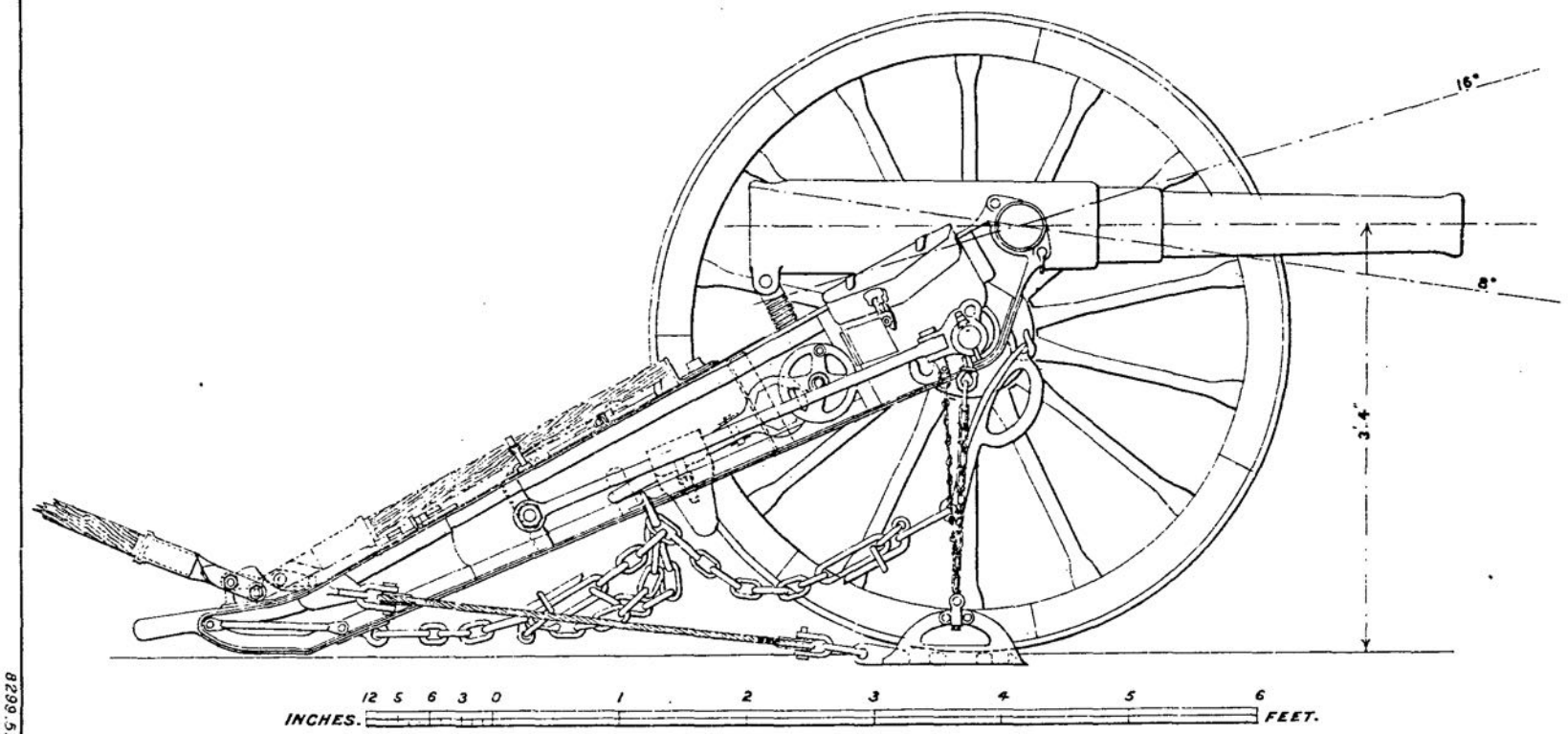


Wyman & Sons, Ltd. Lith. 8202.5.96.



Wyman & Sons, Ltd., ch. 8259.4.98

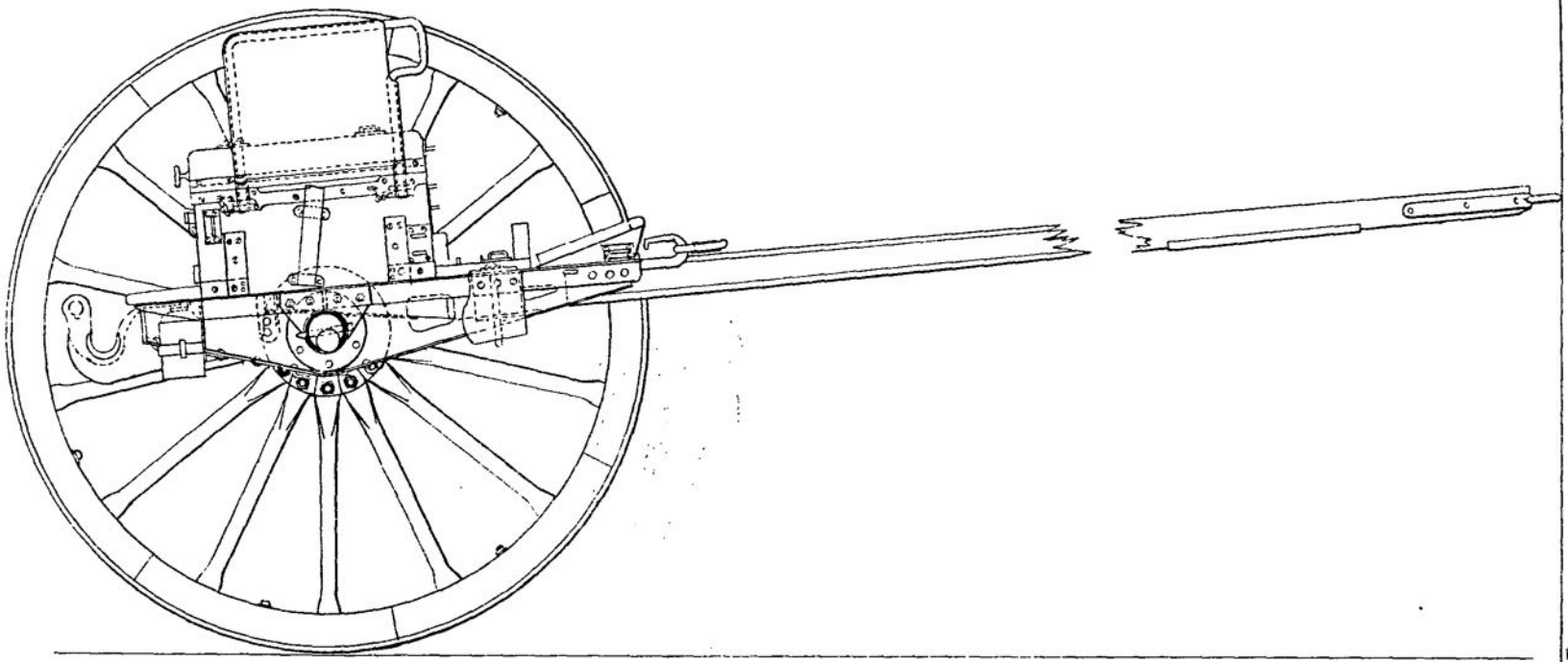
CARRIAGE, FIELD, B.L., 12 PR., 6 CWT.



8299.5.06.

Plate IV.

LIMBER, FIELD, B.L., 12 Pr., 6 CWT.



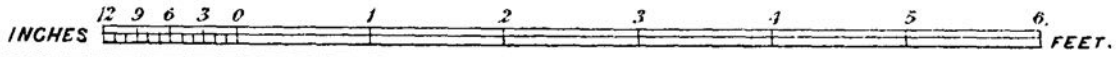
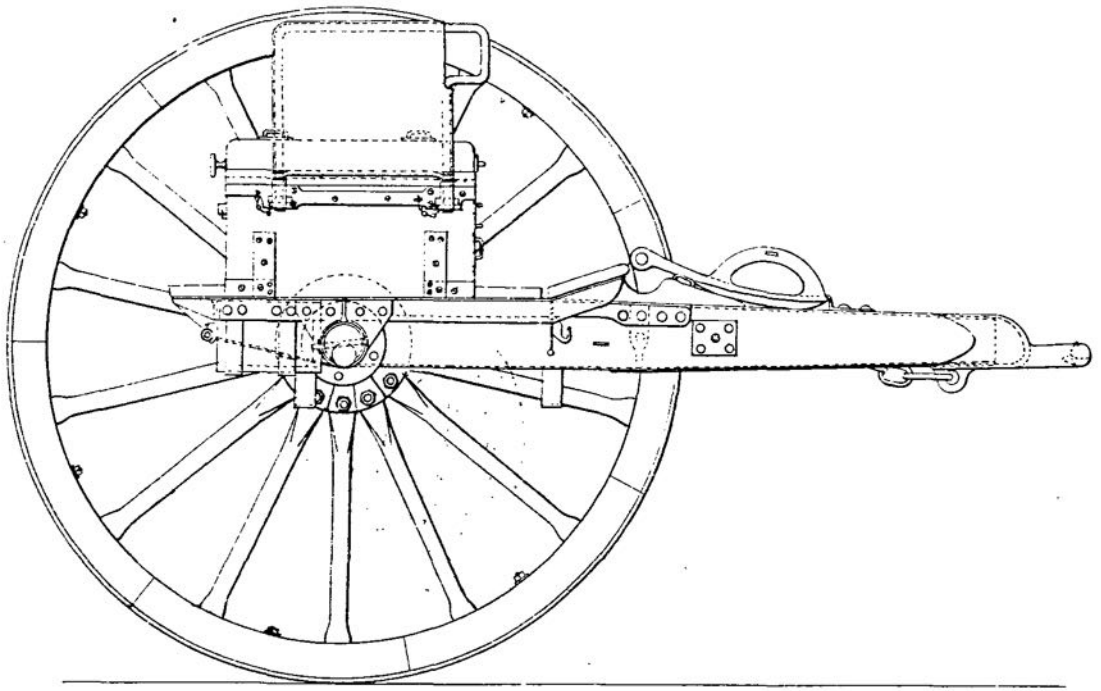


Plate V

8269.S.96.

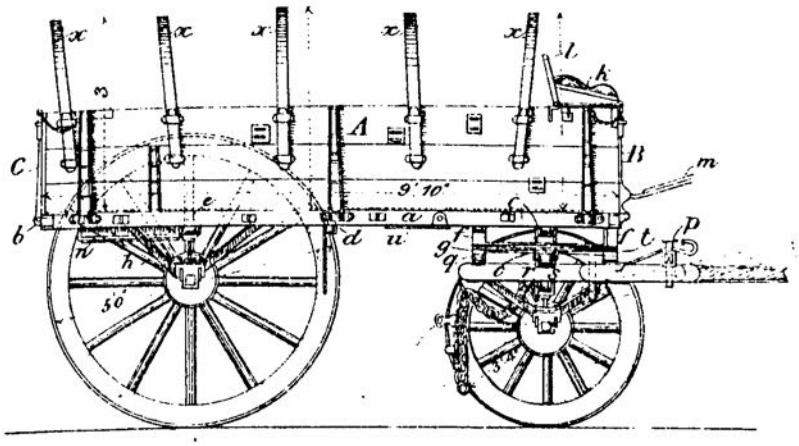
WAGON, AMMUNITION, B.L., 12 PR., 6 CWT.



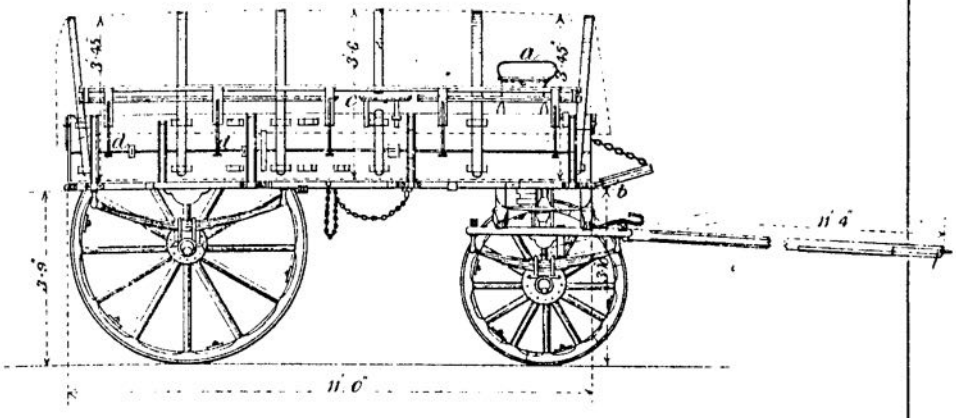
8239.5.96.

Plate VI.

WAGON, AMMUNITION & STORE, R.A., MARK II*



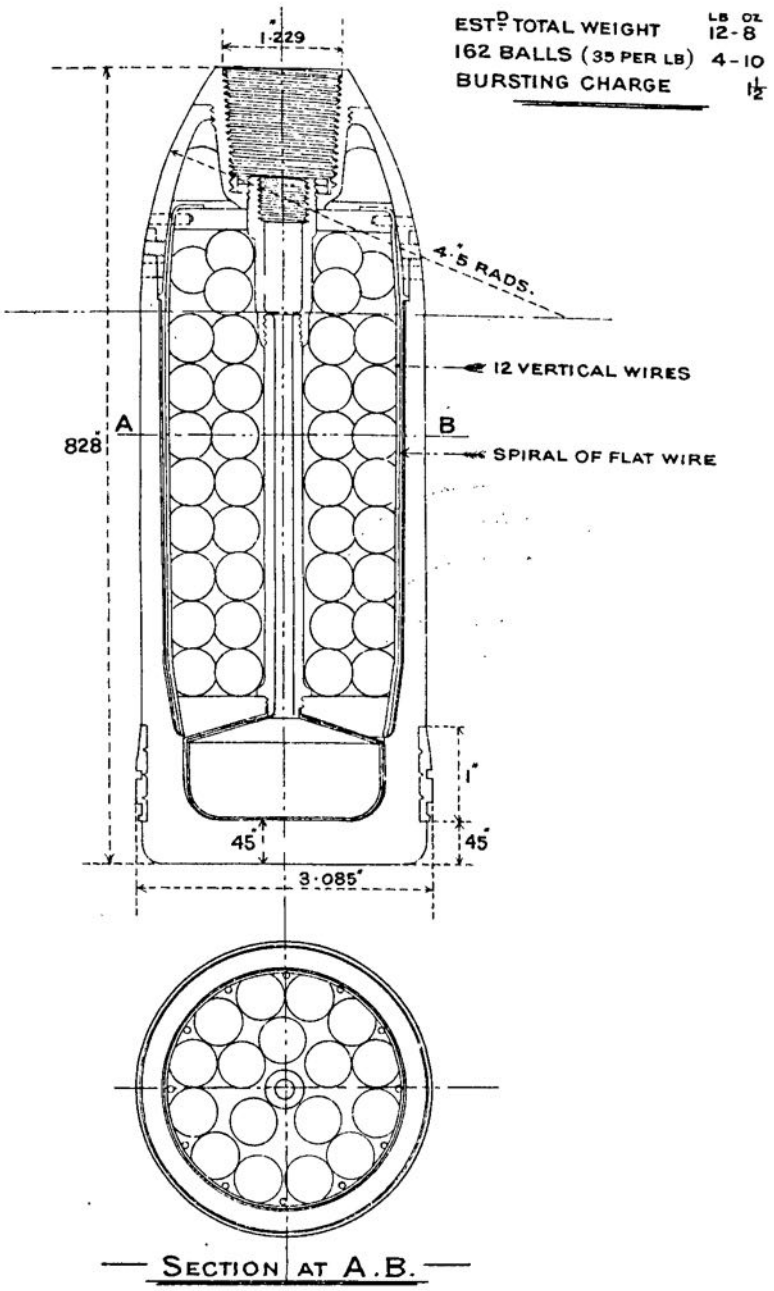
WAGON, ARTILLERY, MARK. I.*



Wyman & Sons, Lt., Lith. 6299.9.95.

SHELL, B.L. OR Q.F., SHRAPNEL, 12 PR, 12, 8 & 6 CWT (MARK II.)

SCALE $\frac{1}{2}$



	LB	OZ
EST^{D} TOTAL WEIGHT	12	8
162 BALLS (35 PER LB)	4	10
BURSTING CHARGE		$1\frac{1}{2}$

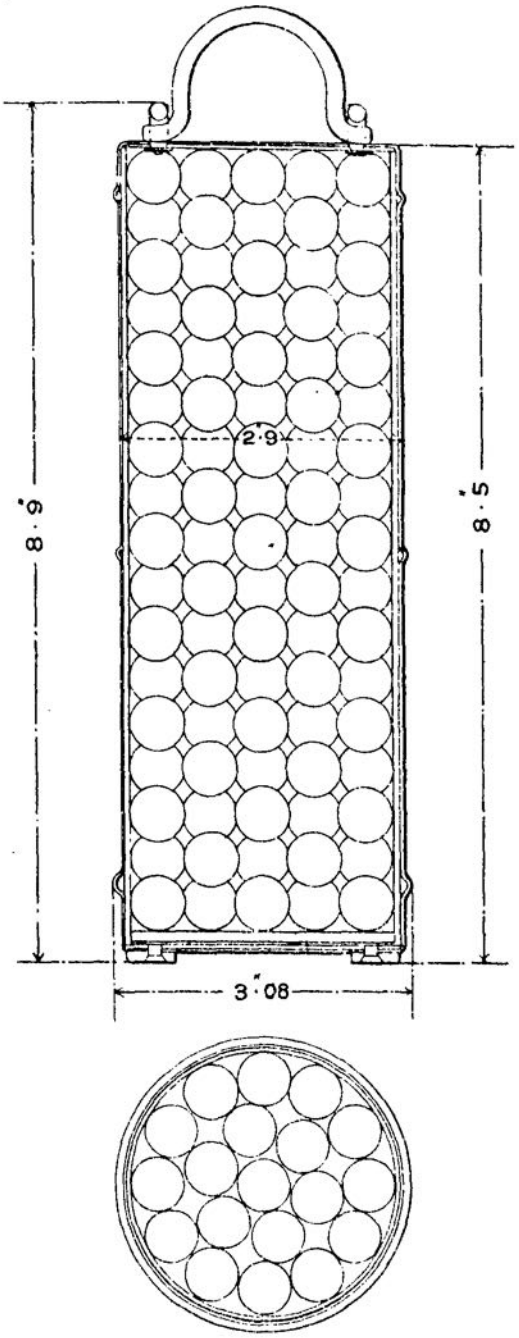
SECTION AT A.B.

Wyman & Sons, Lᵗᵈ, Lith. 8288. 5.96

SHOT, B.L, CASE, 15 PR OR 12 PR (MARK III.)

(for use with Cordite.)

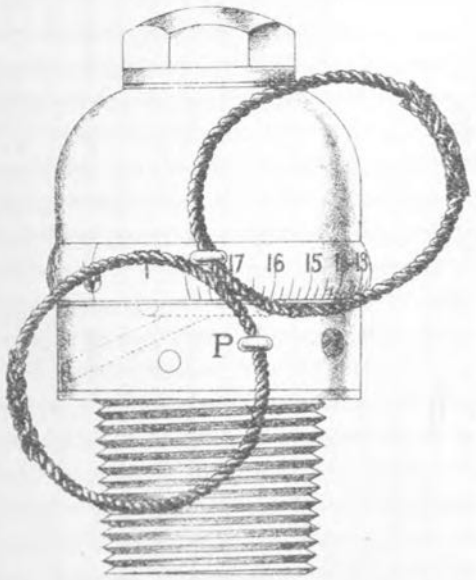
— SCALE 1/2. —



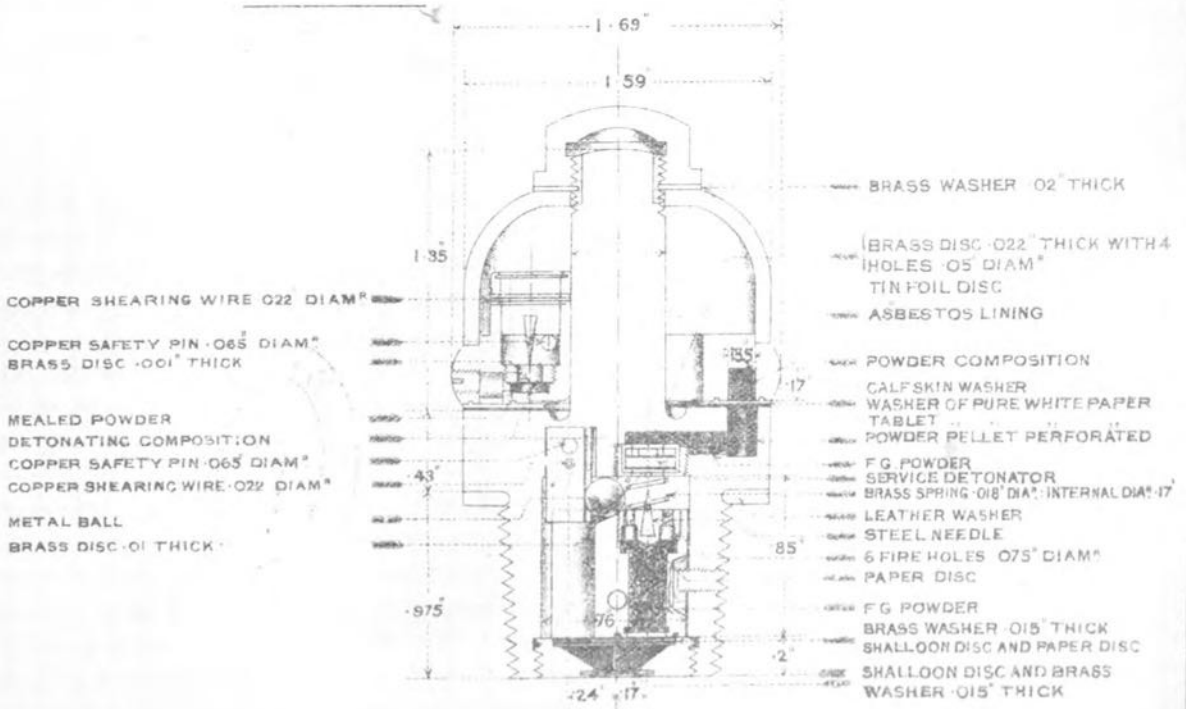
Wyman & Sons. 8/94. 96.

FUZE, TIME AND PERCUSSION, Nº 56 (MARK IV.)

FULL SIZE.



ELEVATION



SECTION

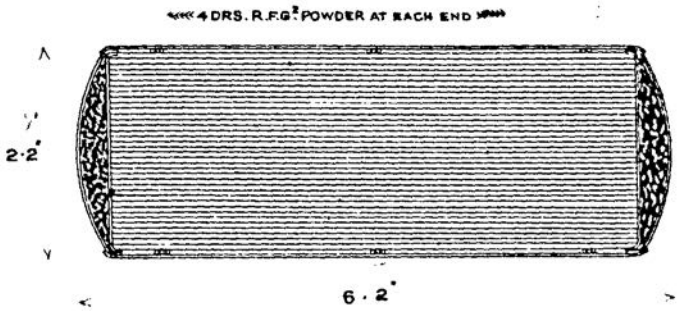
Plate X.

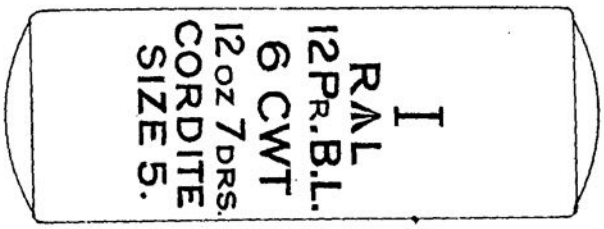
Wyman & Sons, Ltd. 8259. 4.96

CARTRIDGE, B.L., 12 PR 6 CWT., 12 OZS. 7 DRS., CORDITE, SIZE 5., MARK I.

SHALLOON.

— Scale 1/2. —

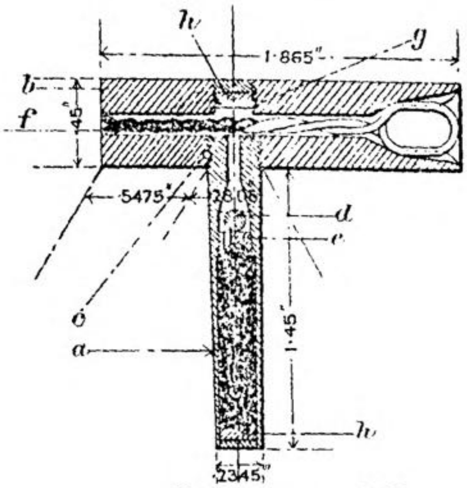




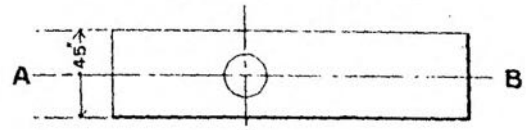
Wyman & Sons, Lt., Lith. 8299.5.96.

TUBE, FRICTION, T. MARK I.

Full size.



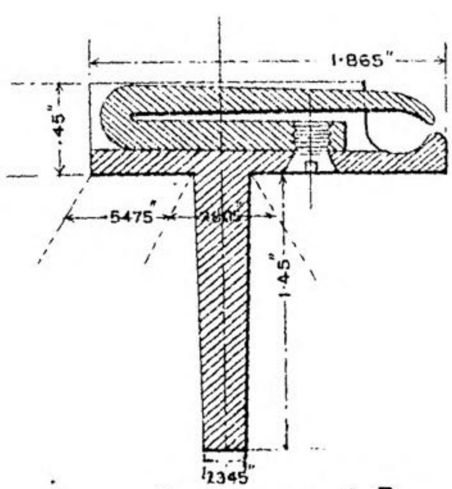
SECTION AT A.B.



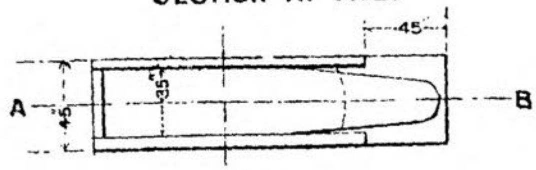
PLAN.

TUBE, FRICTION, T, DRILL, MARK I.

Full size.



SECTION AT A.B.



PLAN.

Wyman & Sons, Ld, Lith, 8299. 7. 96.

B.L.12 Pr 6 CWT. EQUIPMENT LIMBER AND CARRIAGE

I. OFF SIDE AND FRONT BOXES CLOSED

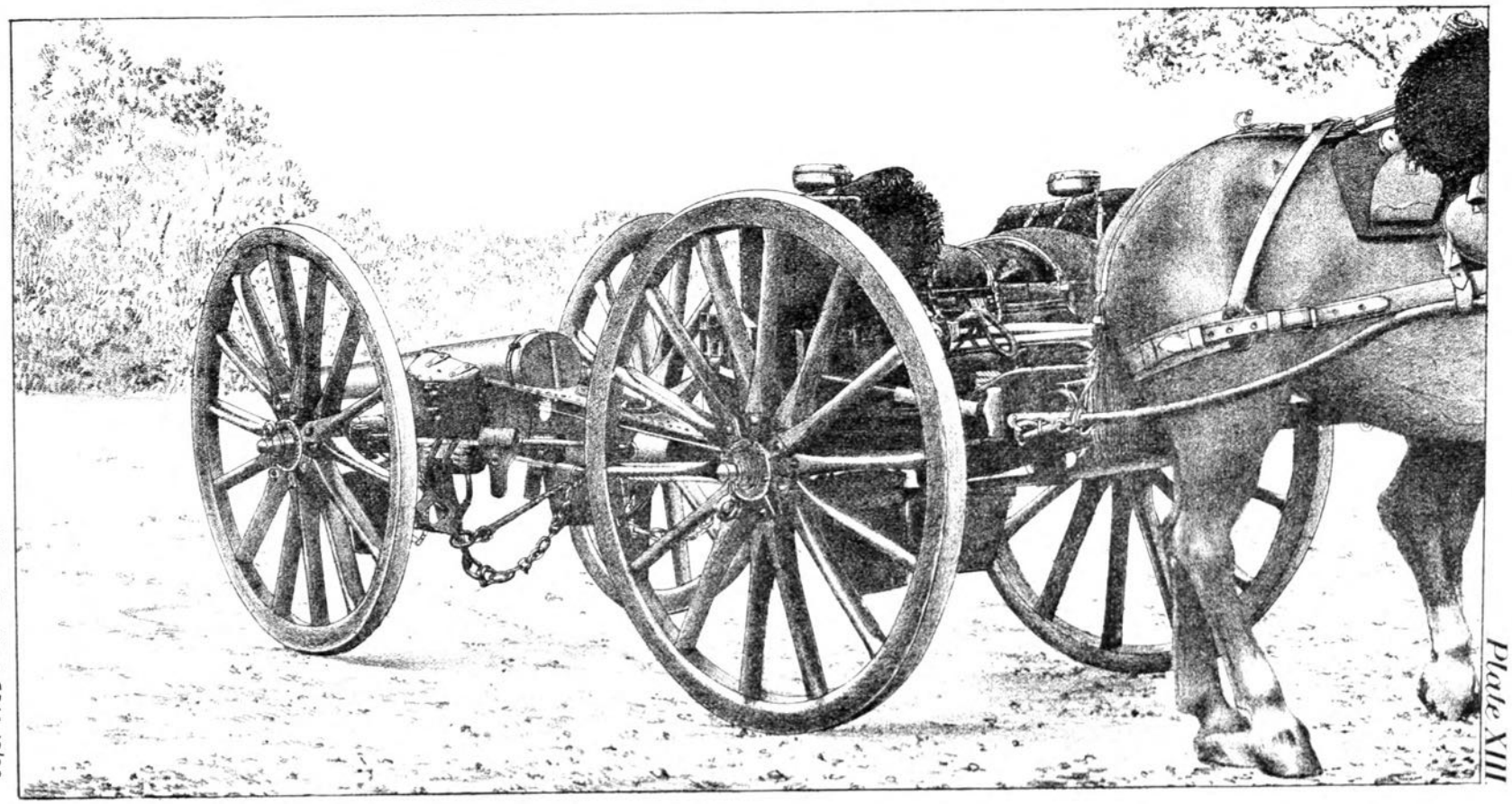
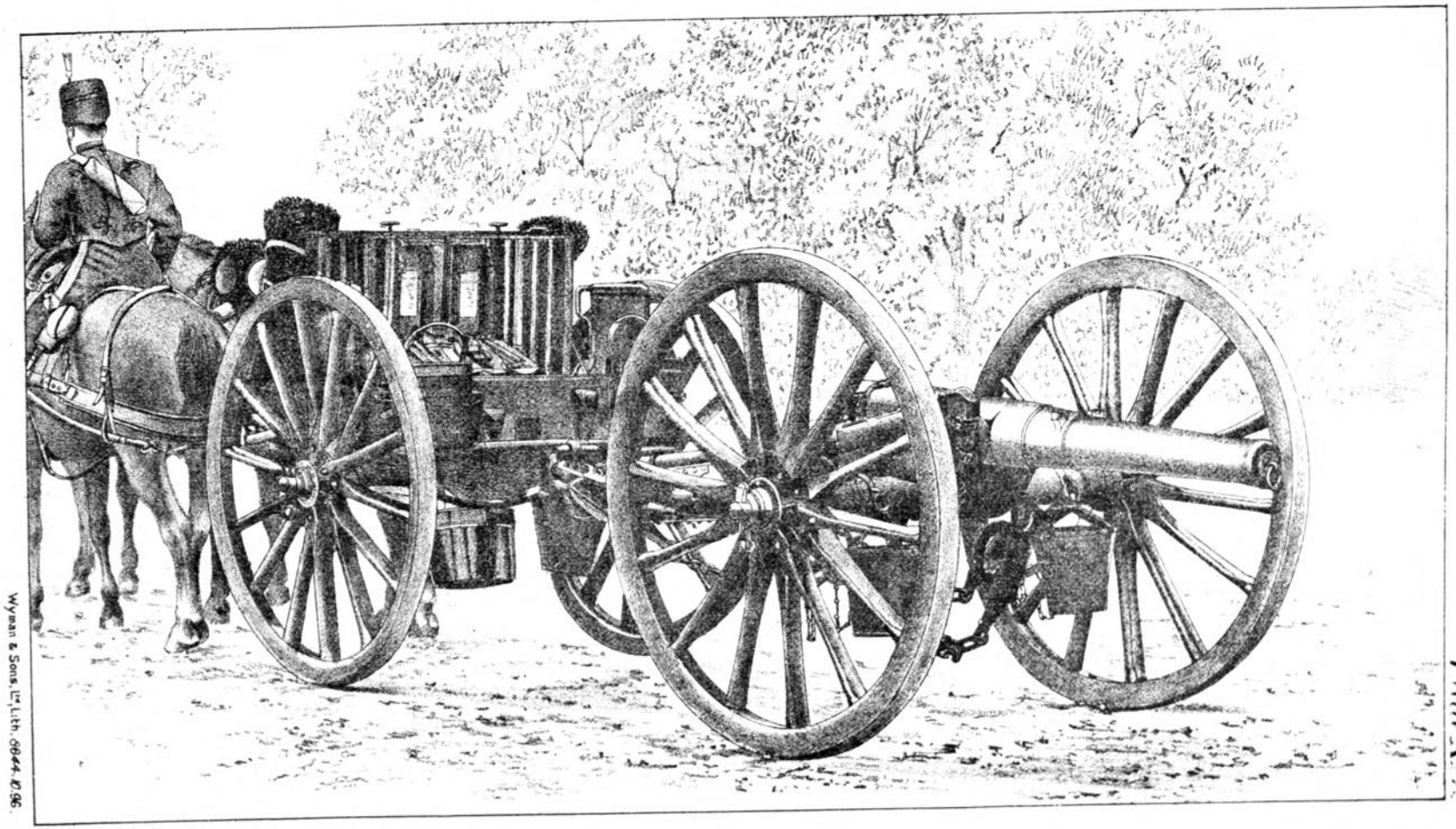


Plate XIII

Wyman & Sons, Ltd. Lith. 8644 10/96

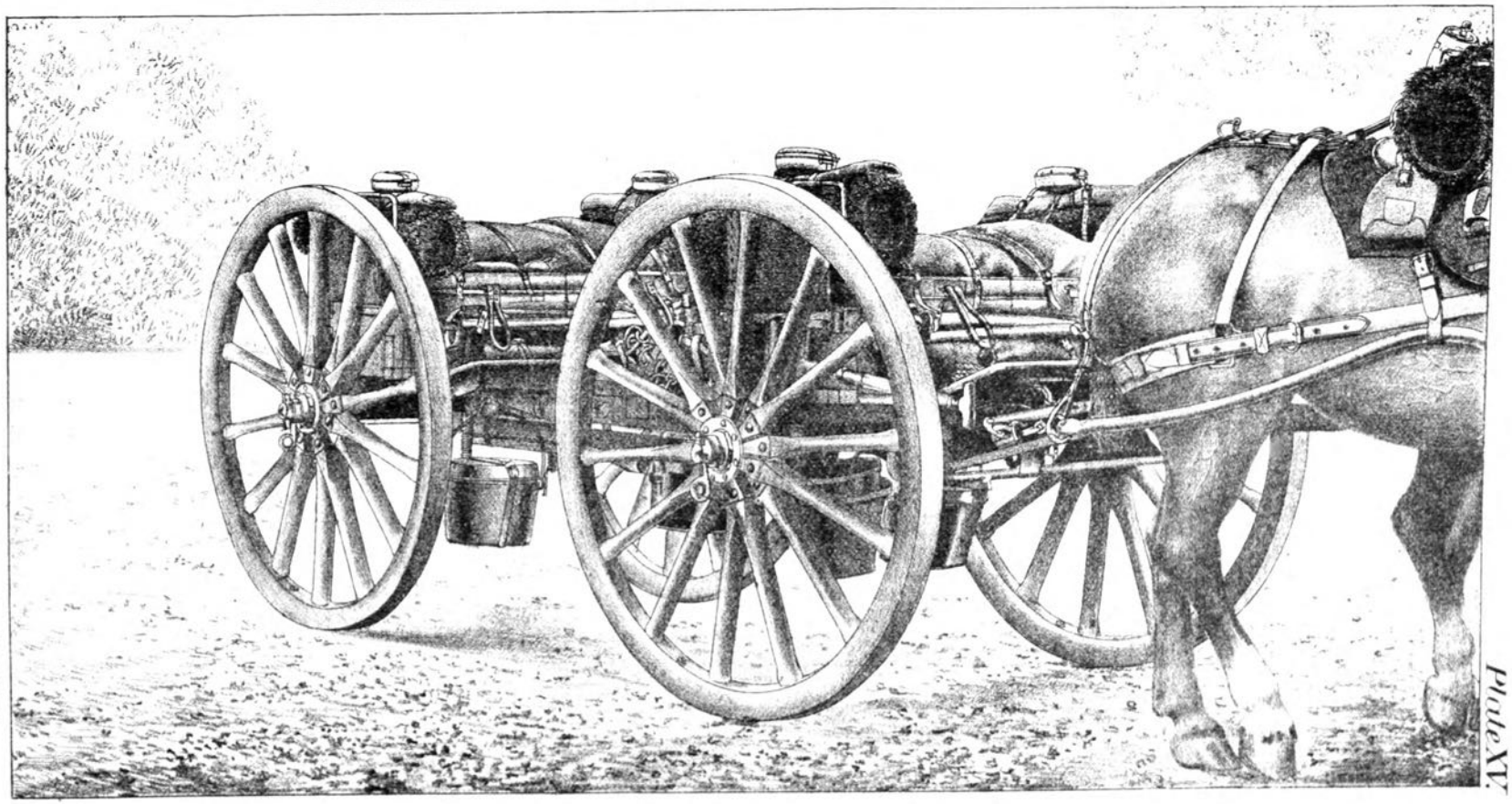
II. NEAR SIDE AND REAR - BOXES OPEN.



Wyman & Sons, Lt.h. Lith. 0644-0.96.

B.L. 12 PR. 6 CWT. EQUIPMENT. LIMBER AND WAGON.

I. OFF SIDE AND FRONT - BOXES CLOSED.



Wyman & Sons, Lt.Lith. 8844.

Plate XV.

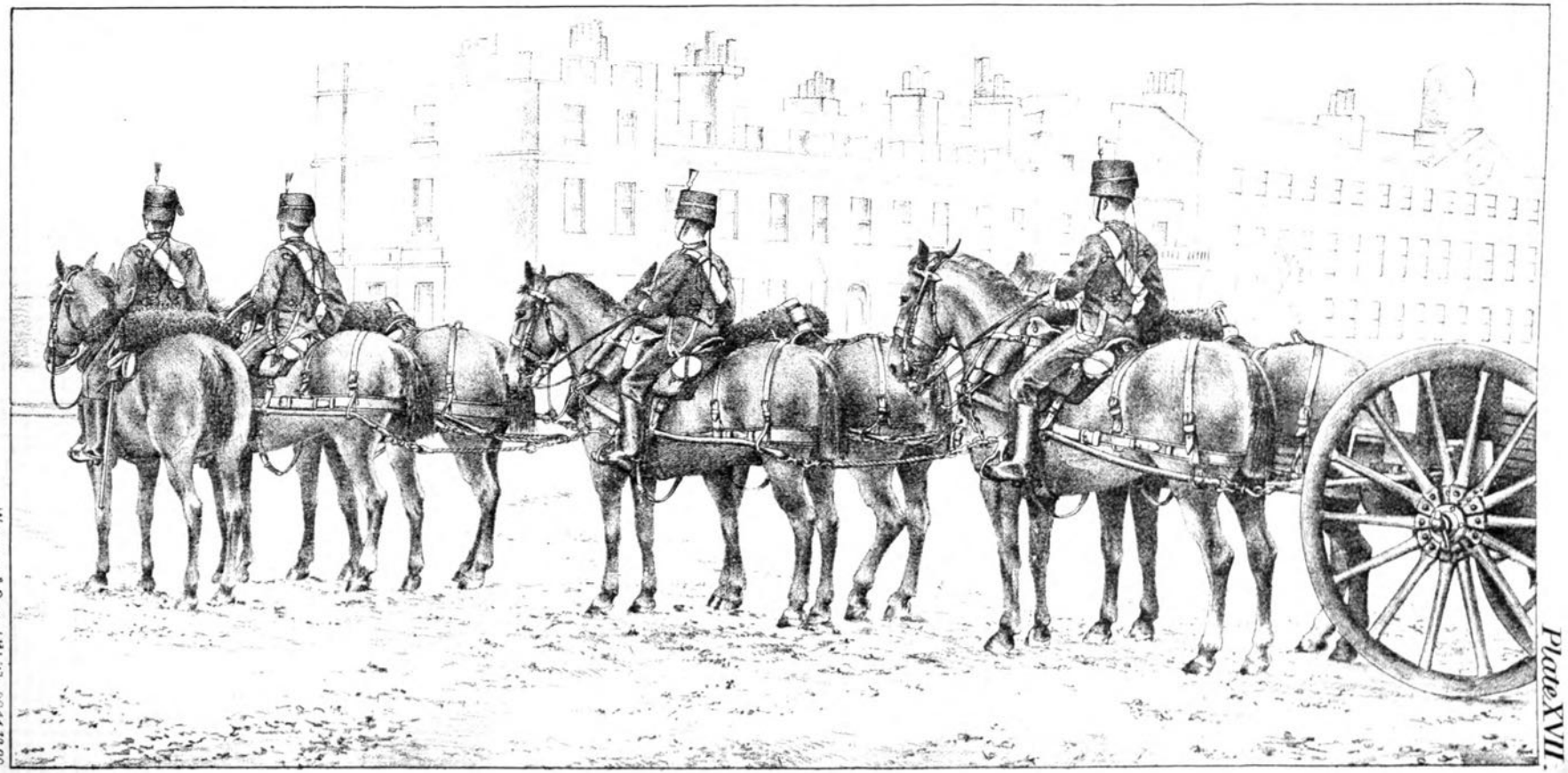
Plate XVI.

NEAR SIDE AND REAR, BOXES OPEN.

Wyman & Sons Lᵗᵈ, Lith. 8644 10/98.

TEAMS B.L. 12 PR. 6 CWT. EQUIPMENT

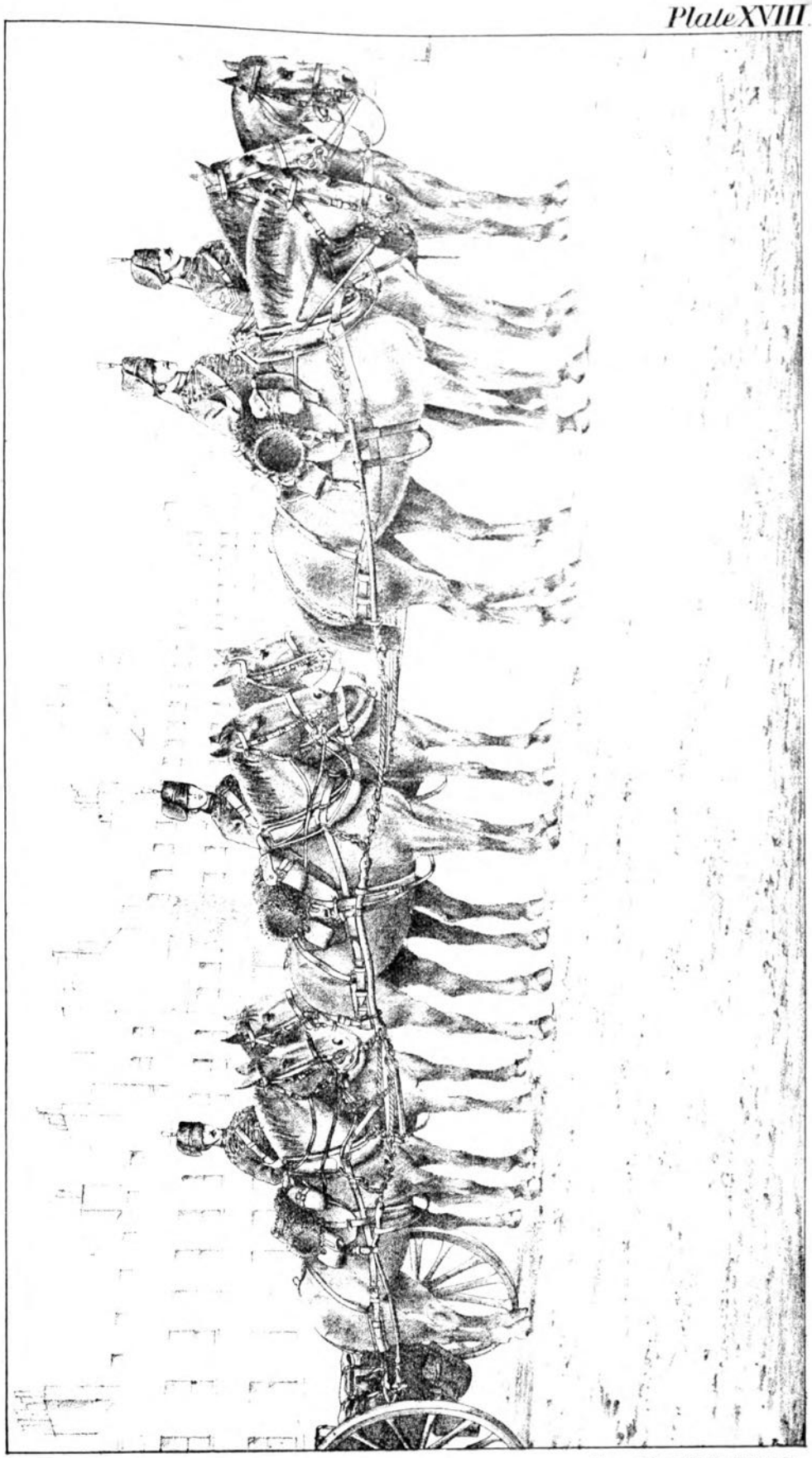
I NEAR SIDE.



Wyman & Sons L^th Lith. 9644 10.96

Plate XVII.

II. OFF SIDE.



Wyman & Sons, Lt.d, Lith. 6644. 10.96.